ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

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REPORT

U.S. Patent Office.

OF THE

COMMISSIONER OF PATENTS,

FOR

THE YEAR 1849.

PART I.

ARTS AND MANUFACTURES.

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WASHINGTON:
OFFICE OF PRINTERS TO THE SENATE.
1850.

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REPORT

OF THE

COMMISSIONER OF PATENTS.

Patent Office, 16th January, 1850.

Sir:—Agreeably to the requisition of the act which makes it the duty of the Commissioner to communicate to Congress the condition of the Patent Office "in the month of January annually," the undersigned respectfully submits Part First of the report for the year just expired. Part Second, assigned to Agriculture, cannot be ready for some months. Under no circumstances could it be prepared by the time designated by law for the presentation of matters relating to inventions, since that would involve the collection and arrangement of statistics for the year before the year expired.

I have the honor to be,
Most respectfully,
Your obedient servant,
THOMAS EWBANK.

To Hon. Millard Fillmore,
Vice President of the United States, and President of the Senate.

I.

FINANCIAL, STATISTICAL, &c.

THE whole number of applications for patents received during the year ending December 31st, 1849, is nineteen hundred and fifty-five; the number of caveats filed during the same period is five hundred and ninety-five. The whole number of patents issued during the year 1849, is ten hundred and seventy-six; including thirty re-issues, five additional improvements, and forty-nine designs. No disclaimers have been entered during the year. Within the year 1849, seven hundred and fifty-one patents have expired; a list of which is annexed, marked F. There were eleven applications to extend patents, the terms of which were about to expire; seven of which were granted and four rejected. None have been extended by act of Congress within the year.

The receipts of the Office for the year 1849, on account of applications for patents, caveats, additional improvements, re-issues, extensions, recording assignments, powers of attorney, &c., and for copies, amount to $80,563.17; to which sum has been added $150.00 received of L. B. Shepperd, Esq., (late United States District Attorney, New York,) recovered of Messrs. Brown and Maher for violation of the 5th section of the act of Congress, approved August 29th, 1842; and the sum of $39.61 on sale of old matting and carpeting, making the whole receipts of the Office for the year the sum of $80,752.78, as per statement marked A.

The expenses of the Office for the year 1849 are as follows: For salaries, $29,072.11; contingent expenses, $12,367.70; library, $2,748.41;* temporary clerks, $10,040.01; agricultural statistics, $3,395.76; refunding money paid by mistake, $509.12; analysis of breadstuffs, $1,400;† librarian, $290.00; Chief Justice of District of Columbia, sitting on appeals from Commissioner of Patents, $100; on applications withdrawn, $17,793.33; amounting, in the whole sum, to $77,716.44, as per statement marked B:—leaving a balance to be carried to the credit of the Patent Fund of $3,036.34, as per statement C.

On the first day of January, 1849, the amount of money in the Treasury to the credit of the Patent Fund was $216,468.83. Of this sum, $50,000 was appropriated by Congress by the act approved March 3d, 1849, for the erection of the wings of the Patent Office, which has been drawn out and expended. The net receipts of this Office for 1849, added to the balance remaining, makes the amount in the Treasury to the credit of the Patent Fund on the 1st day of January, 1850, $169,505.17, as per statement D.

At first glance it may be matter of surprise to some that the amount carried to the credit of the Patent Fund for the year ending December 31st, 1849, should be comparatively so small. This apparent deficit is fully explained by the following remarks taken from the report of the late Commissioner for the year 1848:

"The large *balances over expenditures* which have accrued during the last four years were caused in part by the great increase of applications for

* Of the above sum $2,500 were paid for books ordered in previous years.
† Part of this amount is from the appropriation of 1848.

patents which accumulated to such a degree as far to exceed the ability of the examining force of the Office to dispose of them, thus occasioning a disproportion between the applications and withdrawals as compared with former years. That cause has been removed by the recent increase of the force of the Office, and it may now be expected that until the Office is relieved of its accumulated business, the proportion of withdrawals to the receipts of the Office will be greater than in former years, and consequently the *balance which will accrue to the credit of the Patent Fund will be less.*"

As illustrative of the correctness of the above, it may be well here to state, that out of the receipts of this Office for the year 1849, the sum of $11,353.33 has been paid on withdrawals of applications made previous to that year. The amount refunded on withdrawals upon applications made in 1849, is $6,440. Thus it will be perceived that, had no portion of the receipts of the Office been paid back on withdrawals except upon applications made in 1849, the amount carried to the credit of the Patent Fund from the business of the past year would have been $14,389.67.

The number of cases on examiners' desks January 1st, 1849, was five hundred and thirty-nine; the number of applications received during the year, nineteen hundred and fifty-five, making the whole number of applications before the Office for the year, twenty-four hundred and ninety-four. Of this number, nine cases remained unexamined on the 31st December, 1849. The business of the Office for the past year shows the examination of two thousand four hundred and eighty-five applications, resulting in the issue of ten hundred and seventy-six patents, and fourteen hundred and nine rejections and suspensions, as exhibited per statement E.

The act of March 3d, 1837, constitutes the Chief Justice of the District of Columbia a court of appeal from the decisions of the Commissioner of Patents. The very great increase of Patent business has resulted in rendering the duties of that officer in many cases onerous, and the compensation allowed by law disproportionate to the services rendered. An increase of the amount now paid him, would be no more than an act of justice in view of the duties imposed upon him by law.

With respect to the modification of the patent laws, I beg leave to refer to the able reports of my immediate predecessor, whose views as to the necessity of giving further security to inventors, accord with my own, and to whose forcible language on the subject I can add nothing. It is admitted that all legislation which has in view the security of an exclusive right, is intended to guard the public good against a violation of the faith reposed in its bestowal. That, on the other hand, it is equally the duty of the legislature, if it deems proper to extend to individuals or corporations such right on certain conditions, to protect them in its enjoyment. That such in a greater or less degree is not the case in regard to inventors must be obvious to those who have been conversant with the operation of the patent laws now in force. It is not expected, in view of their modification, that a perfection can be attained which will meet every emergency; but the least which should be done is to apply a remedy whenever an object designed by enactment, is defeated in its operation.

Some years of experience seem to have illustrated the inoperative effect of the law intended to secure the inventor in the enjoyment of his privilege. Were all men equally capable of producing, fewer would be found engaged in plundering inventions which belong to his neighbor. Such, however, not being the case, unfortunately the lack of inventive talent is in many instances

supplied only by the desire for gain, and ingenuity in attaining it, at the sacrifice of the real mechanist.

The public mind, interested in the progress of the arts, as fostered by the establishment of this office, is now turned towards a remedy of the evil; and to the undersigned it seems but justice that the remedy should be applied.

Inadequacy of protection, is what is chiefly complained of—the violation of a right as sacred as any personal possession, without the remedy guaranteed against a petty larceny. It is manifestly unjust that the time and means of the inventor should be expended in defending that which Government accords as peculiarly his own, in every instance where a wilful trespasser is called upon to respond in damages for infringement. He is thus subjected to all the horrors of interminable and ruinous litigation; and, if his assailants are more fortunate in having the means of attack than he of defence, his case is hopeless, and he may be likened, as once were chancery clients, to sheep that, having taken shelter in the hedge, come forth "piteously complaining," leaving their fleece upon the bush.

It may be contended that all other titles to property are justly subject to investigation without limitation;—and that an exception in this instance would be a departure from the well settled principles of practice and law. The argument might be good, were all property equally the result of mental creation and equally susceptible of public invasion. Unlike a chattel, it can be stolen by one, or a thousand, and by all at the same time. Its appropriation by one interposes no obstacle to its larceny by another, and thus the inventor is subject to be plundered by every person who chooses to violate his right. He appeals to the law for redress, and the remedy he adopts proves to be one of self-immolation.

May not, then, the claim of the patentee to his invention present an exception to the general rule governing title—an exception demanded in justice to himself, and without involving any burden to the public? It is intended in its very inception, to subject it to a thorough and rigid examination by competent judges of its originality as well as usefulness; and thus, in the outset, determine the merit that constitutes the requisite upon which a law of title is founded. In the invention of a device, is created a title to it by the inventor himself; and he holds his title against the world, independent of statute enactment, and without fear of fraud, so long as he keeps the production of his mind a secret from his fellow-men. He thus has not only possession, but the right of possession, and the right of property in it, which together complete his title. It is its disclosure, and the resulting benefit to the public, for which the law designs a correspondent benefit to himself; and to this end, carefully guarding the rights of all, it is asked that a modification which shall meet the case be enacted. I would therefore respectfully solicit for this subject the attention and favorable consideration of Congress.

The law now permits what is termed a "re-issue," embodying matter not claimed in the original patent, if shown by the model and drawings. It thus, in effect, makes a new claim admissible, for what originally, may not have been designed to be patented, or supposed to be of essential value. The device having been a part of the first construction of the machine, is now claimed; and, having been new at the date of the original application, a right to its exclusive use is demanded. The grant of this right, in many instances, interferes with machinery subsequently invented by others, thus cutting off such inventors from the benefit of its use. In support of the present construction of the law, it is alleged, that inasmuch as it was through inadvertence or mistake of the applicant in the first instance, that he did not include in his claim the feature desired to be embraced in the re-issue; a patent should now be granted lest the injustice be done of withholding the benefit of an invention actually his own, though not originally claimed. The law has made time and the public use of a device one test of its patentability. An inconsistency therefore, exists between a re-issue and an original application. In the latter case, prior use for two years is a bar to a patent, whereas in the case of a re-issue such prior use is no bar, and it may be granted at any time during the life of the patent. Thus a device may have been in public use for years, for which a patent on a re-issue is desired, but still no objection, under the present law, is made, if it comes within the scope of such an application. A just complaint may be made that devices of old patents, in a great degree inoperative as to any practical purpose, may be claimed on re-issue and an exclusive right to them procured, thus operating against a beneficial invention, containing the same feature subsequently patented or in common use. A system of tribute is in this way levied, originating with the indefatigable explorers of old and useless patents, whose object is to discover something which they may now claim under the law, and which can be used to legal advantage in defiance of equitable right. A party not the inventor presents an assignment of a worthless patent, obtained, perhaps, for a trifling consideration—procures the re-issue—and accomplishes his purpose. In my opinion the restriction of the law in the one case and the non-restriction in the other, are in principle at variance, to say nothing of the hardships arising from its practical operation. It is, therefore recommended that no re-issue, containing a claim broader than the original claim, be granted, unless application therefor be made within two years from the date of the letters patent.

By reference to the statement of receipts and expenditures of this office for the current year, it will be found that eleven thousand three hundred and fifty dollars and thirty-three cents has been refunded on withdrawals made previous to the first day of January, 1849. This sum has been drawn entirely from the income of the office for the past year, and although that amount is even greater than the sum carried to the credit of the patent fund for the year 1848, still it is but reasonable to suppose that the number of applications rejected must yearly increase in a far greater proportion than the number of patents issued, and thus, from year to year, the revenue of the office be decreased. From the report of '48, it will be found, that in a period of four years (from 1841 to 1845,) the number of rejections were only thirteen hundred and ninety-nine. For the period of four years following, they amount to three thousand three hundred and fifteen; and for the year 1849, to fourteen hundred and nine. It may therefore be confidentially anticipated, that the next like period of time will exhibit a corresponding increase of rejections compared with the patents issued. To provide for this contingency, it becomes necessary to devise means of increasing the receipts, and thus avoid a deficit which might otherwise occur. For this purpose, I would suggest the following amendments of the fiscal laws governing this office; and this is done with less hesitation inasmuch as they will merely serve to apportion more justly the fees demanded in each case to the services rendered.

First.—Whenever a patent is refused, the applicant is entitled to receive back two-thirds of the fee paid, leaving, in ordinary cases, for the services rendered by the office but ten dollars; whereas the actual expense of exami-

nation, &c., in this office is, on an average, much more than that sum, and the deficiency must be made up by others. Thus the quasi inventor, who has given nothing to the arts, fails to pay his proportion of the expense of the office, while the *real* inventor is required to make up the deficiency. It not unfrequently happens that the office is speculated upon by inventors and agents with regard to examinations. They find it (as some have admitted) cheaper to give the office ten dollars for the investigation of a case than to purchase the necessary books and examine for themselves. By this means an amount of labor is often involved, costing the office in almost every instance, more than the amount received. But this expense to the office is doubled, and often tripled, after the examination, by rehearings and by a correspondence with the disappointed applicant, continued from one to twelve months in duration. In view therefore of the foregoing considerations, I would recommend, that but *one-third* of the fee paid should be returned in cases of withdrawal. Upon this subject communications have been received from persons whose opinions are entitled to great consideration. The following extract is from a letter received from a gentleman who was fourteen years in this office, but who now, having no official connection with it, may be regarded as free from bias:

"As the increased expenditures of the Patent Office may produce a deficit in the revenues, and I had occasion some few years back to investigate this subject, I take the liberty of submitting for your consideration some suggestions which may aid you in determining the best course to be pursued.

"From my knowledge of inventors, I am safe in saying that they are willing to submit to the payment of a higher duty than thirty dollars for a patent, if it be necessary, in order to secure and maintain an efficient and prompt administration of the Patent Office.

"An efficient, judicious, and prompt examination of applications for patents is of the first importance to inventors; for on the efficiency and good judgment of the examination depends, in a great measure, the integrity of patents, and on the promptness of it, the success of the inventor's enterprise. There is no estimating the loss which inventors sustain by reason of delays in the grant of patents; if therefore an increase of fees should be required to maintain such prompt and efficient administration of the office, you may rest assured that your recommendation will be supported by nearly, if not all the inventors in the country. But I feel satisfied that this measure will not be necessary. The present law authorises the repayment of two-thirds of the fee paid into the treasury, on the withdrawal of an application, and as about one-half the applications are rejected, the withdrawals reduce the receipts of the office one-third, which if retained, would make the revenue amply large to cover all the expenses necessary to the desired efficiency of administration.

"I have never been able to see any sound reason for the provision of the law authorising withdrawals. A duty is imposed on applicants for patents, not as a payment to the government for the protection which it extends to the patentee, but simply to cover the expenses which the government incurs in adjudicating the claims of applicants, and in granting patents; and in view of this, it was estimated that thirty dollars for each application would cover the average expenses. Now, if it cost as much to examine and reject an application as it does to grant a patent, why should the patentee pay more than the unsuccessful applicant. From my experience, more labor is bestowed by the office on the rejected applications, than on the successful ones, and for this reason — the rejection can only be made after a careful and

laborious investigation — and the disappointed applicant never remains satisfied with one examination and rejection. He will persist in urging his claims, and often with the assistance of skilful counsel. The views submitted must be examined, and arguments answered, all of which involve much labor and require much skill. But with successful applications, the one examination is sufficient; and at most it is only necessary to see that the application is properly amended in accordance with the first examination. When the application is passed, there remains but the expense of engrossing and recording, which on the average, makes but a small part of the expense.

"I feel satisfied that after a careful examination you will find, that the rejected applications — those that have been withdrawn have cost the government more than the granted applications — and, if I am right, they should certainly cost the applicant as much.

"But there is another light in which this subject should be considered. The present law encourages the making of applications for matters of doubtful novelty; and in the course of my practice, I have often been told by applicants, after assuring them that there was no novelty in their alleged inventions, that they would nevertheless try, for if they failed it would only cost them ten dollars as they could withdraw twenty dollars.

"In view of all this, would it be just to impose an additional duty on patentees — the real inventors, who really confer a benefit on society—to shield the unworthy applicants or the pirates who seek to obtain surreptitious patents for the inventions of others.

"If there be any justice in requiring the payment of a duty to defray the expenses of the Patent Office, unsuccessful applicants should be required to pay as much as patentees." * * * * * * *

Second. — A fee of twenty dollars is required upon the filing of a caveat. Upon the filing of the application by the caveator, the whole fee of twenty dollars is allowed in the fee for the application, leaving nothing for the caveat; so that he who has the benefit of the caveat and the application also, pays no more than he who files his application merely. Caveats are a source of constant labor, anxiety and expense to the office, and he who files them and derives from them security for his rights, should, in common justice, pay the expenses they impose upon the office; for unless the expense is paid by him who derives the benefit, it must fall on those who do not. I would, therefore, recommend that twenty dollars, as heretofore, be required upon the filing of each caveat, but that only ten dollars of this fee be allowed in part payment of fees on completing the application.

Third.—The law now in force allows a patentee to take out a patent for any additional improvement made upon his patented invention, upon the payment of *fifteen dollars*, whether he be a citizen of the United States or a foreigner. There seems to be no just reason for this distinction between fees for original patents and for letters patent additional. The nature of the invention is the same in both cases; and the questions which arise under the original, arise also under the application for additional letters patent. There are, moreover, some questions to be settled under the latter application, which do not arise in the former. On the whole, the actual expense to this office attending the grant of letters patent additional, or the rejection of an application therefor, are at least as great as in cases of an original application. A distinction in the fees could hardly have arisen from a correct apprehension of the subject. Besides, the privilege of receiving this patent *for half the usual fee*, is confined to the prior patentee; but,

if one of his neighbors invent the same thing, he must pay the full fee of thirty dollars for his patent. If a subject of the Queen of Great Britain, be the patentee, he can take out a patent for his improvement for fifteen dollars; while any one of his fellow subjects would be required to pay five hundred dollars for a patent for the identical improvement. There is obviously a burdensome discrimination in the provision in question, and by the distinction made, the law becomes partial in its operation. I would therefore recommend that all provisions in relation to letters patent additional, be repealed as unnecessary and unequal. Unnecessary, because, if such improvements are patentable at all, they are so under the general provisions of the law; and unequal, because they extend privileges to a few which are withheld from the many; and that without any peculiar merit on the part of those privileged.

Fourth.—The foregoing objections apply with equal force to the law which provides for the re-issue of patents upon payment of a fee of fifteen dollars. All the labor and expense attending the grant of letters patent in *any case*, are required in a case of re-issue; and, in addition to those which are usual, other questions sometimes of great difficulty arise. It is not sufficient to determine whether the thing claimed in the re-issue is new, but it must be determined whether it was new when the patent was granted. This precise ascertainment of dates, therefore, requires much careful research, and consequent labor, which would be wholly unnecessary in ordinary cases. In other particulars, these cases often require more care and labor than is usual with common applications; and it is safe to say that each application for a re-issue costs this office nearly double the ordinary expense of applications upon which the full fee is paid. It is therefore recommended that upon all application for re-issue of patents, at least the full fee of thirty dollars should be paid, and that no part of it be returned in case of rejection.

The foregoing suggested amendments ought, in my opinion, to be made upon a simple ground of a fair division of the expenses of this office among those whose interest it was established to protect, even though no increase of revenue were required. Should too much revenue accrue, a *general* diminution or reduction of fees should be adopted, instead of relieving one class of applicants from their just proportion of the burden and imposing it upon another.

It has been proposed to grant "patents of importation," agreeably to the practice of England, France, Belgium, and other countries, with the view that valuable inventions, now supposed to be used in secret, may be brought from abroad. On the other hand, it is alleged, and with reason, that the granting of monopolies to mere introducers, regardless of the rights of authors, is no better than fostering espionage and legalizing fraud; establishing premiums for the most adroit of freebooters. Certain it is, not a few American inventors suffer by the practice. It has almost become a regular business for patent speculators to cross the Atlantic with discoveries surreptitiously obtained, and after securing or selling them, to laugh at the owners for not being sufficiently alert to reap the advantage themselves. The system is unworthy of an enlightened people, and can never be adopted without reacting, sooner or later, on those who uphold it. That which is fraudulent between individuals can hardly be anything else when a government is a party, no matter by what name the transaction may be designated, nor by what pretences justified. If a new machine or manufacture is beyond our imitation, without instruction as to its production, it ought to remain so till

we study the secret out. Our laws award patents to "original inventors," or their assignees. This is what the highest morality demands, and in its working it has proved consonant to the soundest policy. In every point of view, it would, in the opinion of the undersigned, be better to adhere to it, than to adopt the devious practice prevailing elsewhere. The general sentiment of the age, on these matters, is fast ripening; and soon international policy will no longer sustain the spoliation of "true inventors," let them be located where they may.

There may be special exceptions to the opinions thus stated, and these would consist of processes of manufacture not new in the country where they are employed, not the property of any individual, and studiously withheld from publication by the authorities of the state, thus monopolizing a peculiar branch of manufacture. When such processes are discovered and introduced, Congress has the power, by special legislation, to reward the introducer, and such legislation would be, I conceive, all that a sound policy could recommend in the matter of granting patents for introduction.

To furnish a synopsis of Patented Inventions from 1790 to 1850, the subjoined analytical tables, (marked J.) have been prepared by Mr. Lawrence, Chief Clerk, in which he has particularized the several states to whose citizens the patents were issued. Great pains have been taken in their compilation and every person interested in marking the progress of invention on this continent, can hardly fail to be gratified in perusing them.

[A.]

Statement of receipts for patents, caveats, additional improvements, re-issues, extensions, recording assignments, &c., and for certified copies.

Amount received for patents, caveats, re-issues and additional improvements, ...	$75,690 00
Amount received for recording assignments, &c., and for copies, ...	4,873 17
Amount received of L. B. Shepherd, United States District Attorney, New York, recovered of Brown and Maher, for violation of act of May 29th, 1842, ...	150 00
Amount received on sale of old matting, &c., ...	39 61
	$80,752 78

[B.]

Statement of expenditures and payments made from the Patent Fund by the Commissioner of Patents from January 1st, 1849, to December 31st, 1849, inclusive, under the act of March 3d, 1837, and subsequent acts of Congress making provision for the expenses of the Patent Office, viz:

For salaries, ...	$29,072 11
" Contingent Expenses, ...	12,367 70
" Books for Library, ...	2,748 41
" Temporary Clerks, ...	10,040 01
" Agricultural Statistics, ...	3,395 76
" Refunded money paid in by mistake, ...	509 12
" Analysis of breadstuffs, ...	1,400 00
" Librarian, ...	290 00

For Withdrawals, ...	$17,793 33
" Compensation of District Judge, ...	100 00
	$77,716 44

[C.]

Statement of the Receipts and Expenditures of the Patent Office for the year 1849.

Amount received from all sources, ...	$80,752 78
Amount of expenditures of all kinds, ...	77,716 44
Amount carried to the credit of the Patent Fund for the year 1849, ...	$3,036 34

[D.]

Patent Fund, January first, 1850.

Amount of fund on 1st January, 1849, . .	$216,468 83	
" drawn out for erection of wings to Patent Office, ...	50,000 00	
	$166,468 83	
Amount carried to credit of Patent Fund for 1849, . .		3,036 34
Amount remaining in Treasury to credit of Patent Fund, January 1st, 1850, ...		$169,505 17

[E.]

Statement of applications on hand January 1st, 1849, *and number received during the year and acted upon.*

No. of cases on examiners' desks, January 1st, 1849, ...		539
" applications received in 1849, ...		1,955
" before the office during the year, ...		2,494
" of Patents issued during the year, ...	1,076	
" applications remaining unexamined, ...	9	
" of rejections and suspensions, ...	1,409	
		2,494

[F.]

CLASSIFIED LIST OF PATENTS

THAT HAVE EXPIRED DURING THE YEAR 1849.

CLASS I.—AGRICULTURE, *Including Instruments and Operations.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bee-hive	Samuel Morrill	Dixfield, Maine	Jan. 16, 1835
Bee-hive	Orlando Mack	Gilsum, N. H.	Apr. 22, "
Bee-house	William Groves	Harrisburg, Pa	June 12, "
Cheese, turning and curing	Henry Webber	East Richfield, N. Y.	Apr. 22, "
Churn	Iram Brewster	Schoharie co., N. Y.	Jan. 7, "
Churn	Francis Colton	New York	Jan. 9, "
Churn	Benjamin Randall	North Pownall, Me.	Mar. 11, "
Churn	Samuel Clark	Parkman, Maine	Apr. 22, "
Churn	Philip S. Lowell	Farmington, Maine	May 29, "
Churn	Michael Knight	Pownall, Maine	May 9, "
Churn	Isaac Wood	Fayette co., Ind	June 26, "
Churn	Oliver Wyman	Dedham, Mass	July 17, "
Churn	Hiram Phelps	Williston, Vt	July 21, "
Churn	William A. Herrick	Green, Maine	July 21, "
Churn	Russel Bradley	Williston, Vt	July 21, "
Churn	Joseph Turner	Poland, Maine	Aug. 15, "
Churn	Caleb Angevine	New York	Aug. 17, "
Churn	Clifton C. Stearns	Buckport, Maine	Aug. 17, "
Churn	Reading Ryerson	Jay, Maine	July 17, "
Churn, cutting floats of	Ezra Whitman, Jr.	Winthrop, Maine	Mar. 27, "
Churn, propelling and cradles	Asahel Bacon	Windsor, N. Y.	Oct. 10, "
Churn, propelling by weights	Lewis Hinkson	Hallowell, Maine	Jan. 7, "
Churn, spiral spring	Ira Park	Delhi, N. Y	Jan. 16, "
Churn, and washing machine	Charles Otis	Finksburg, P. O. Md.	June 12, "
Churn, and washing machine	Thomas Ling	Winthrop, Maine	Sept. 9, "
Churn, and washing machine	J. H. Taylor and A. J. Cowles	Westfield, N. Y.	Feb. 11, "
Corn sheller	Eph. Rand and Adna L. Norcross	Hallowell, Maine	Feb. 13, "
Corn sheller	Dunbar and Powers	Portland, Maine	June 26, "
Corn sheller	John P. Small	Gilmanton, N. H	July 21, "
Corn sheller	Joseph Turner	Portland, Maine	Aug. 15, "
Corn sheller	Elijah Morse	Knoxville, Tenn	Sept. 9, "
Corn sheller	James S. Harris	Poultney, Vt	Sept. 18, "
Corn sheller	Robert Gray	Northfield, N. Y	Jan. 16, "
Corn sheller and cleaner	Gordon Gatling	Murfreesboro', N. C.	June 19, "
Cotton thinner	David Davis	Fredericksburg, Va.	July 17, "
Cultivator	Edward Badlum, Jr.	Chester, Vt	Sept. 18, "
Cutting cradle for grain	D. Ashmore and J. Peck	Jefferson co., Tenn.	Sept. 18, "
Cutting grain, grass seed collector	Abraham Rundell	Verona, N. Y	Apr. 22, "
Cutting grain, and rake	Sturdivant and Holmes	Portland, Maine	June 19, "
Cutting grass	John P. Chandler	Milton, Maine	Aug. 17, "
Cutting grass	John Harmony	Chambersburg, Pa.	Aug. 20, "
Graineries, wheat, &c.,	Stacy West	Harford county, Md.	Jan. 16, "
Hulling clover seed	Joseph Ross	Boundbrook, N. J.	Feb. 6, "
Hulling clover seed, and cleaning	Brayley and Walker	Phillips, Maine	June 6, "
Hulling clover seed, and rice	Isaac Adams	Boston, Mass	Jan. 13, "
Hulling coffee berry	Thos. Ditson	Boston, Mass	Jan. 13, "
Hulling coffee berry			
Hulling cotton, clover, and other seed	John Whiteman	Philadelphia, Pa	June 26, "
Hulling cotton seed	Miller and Lawes	Washington co. Miss.	Oct. 27, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Hulling cotton seed, and rice	Sirah Kellogg	N. Hanover co. N.C.	Mar. 30, 1835
Hulling rice, polishing	William Searbrough	Savannah, Ga	Apr. 14, "
Lime, &c., spreading	Julius Hatch	Great Bend, Pa	Aug. 17, "
Lime, &c., sowing	Julius Hatch	Great Bend, Pa	Aug. 17, "
Plough	David Ghormley	Wayne town'p, Ohio	Feb. 13, "
Plough	Nathan Robinson	Sackett's Har. N. Y.	Feb. 13, "
Plough	Joseph Tinkler	Warwick t'p, Ohio	Mar. 2, "
Plough	Nathan Baker	Penn township, M.T.	Mar. 24, "
Plough	William Hess	Lower Saucon, Pa	Mar. 27, "
Plough	Samuel Cline	Plumstead, Pa	July 17, "
Plough	P. Stahl and John Diffenbacher	Turbet, Pa	Sept. 18, "
Plough	William Walker	Washingtonville, Pa.	Oct. 6, "
Plough	Jarius S. Tefft	Amherst, N. Y.	Oct. 17, "
Plough, breaking & cultivating, &c.	Guy Gray	Industry, Maine	Sep. 18, "
Plough, carey bull	Benjamin Johnson	Hickory Grove, Ill.	Feb. 20, "
Plough, coulter and shares	Samuel A. Sperry	A. Arborville, M. T.	Oct. 27, "
Plough, hill side, inverting, &c.	John W. Jordan	Lexington, Va	Oct. 28, "
Plough, polyshare	Frederick Brewster	Burlington, Vt	Jan. 24, "
Ploughshare, coulter, and mould board	William Holt	Buffalo, N. Y	Aug. 27, "
Rake, horse	Noah Briggs	New Hartford, N. Y.	Feb. 11, "
Rake, horse	James Pudney	Stanford, N. Y	Nov. 7, "
Seeding, corn planter	Thomas D. Burrall	Geneva, N. Y	June 26, "
Seeding, cotton planter	Michael Beam	Buffalo, N. C	Feb. 13, "
Seeding, cotton planter	Jordan Gatling	Murfreesboro', N. C.	June 20, "
Seeding, cotton planter	Robert T. Goodman	Ballsville, Va	Sep. 18, "
Smut machine	Thomas J. Sands & Benjamin Kendig	Washington t'p, Pa	Mar. 18, "
Smut machine	John Card	Gainesville, N. Y	June 20, "
Smut machine	John Turk	Columbus, Pa	Nov. 7, "
Smut machine	Edward P. Fitzpatrick	Mount Morris, N. Y.	Nov. 14, "
Smut machine, and garlic	Abraham Hurst	Allen township, Pa	Jan. 23, "
Straw cutter	Nimrod Murphree	Nashville, Tenn	Jan. 21, "
Straw cutter	Stephen Ustick	Philadelphia, Pa	Feb. 5, "
Straw cutter	John Deakyne	Petersburg, Va	April 2, "
Straw cutter	John W. Cope	Franklin co., Tenn	Ap'l 22, "
Straw cutter	Stephen Ustick	Philadelphia, Pa	May 29, "
Straw cutter, &c.	James McMath	Crawford, Pa	June 26, "
Straw cutter	Earnst G. Augustin	New York	July 6, "
Straw cutting	Ashman Hall	Kent, N. Y	Nov. 7, "
Straw, cutting cabbage, paper, &c.	Henry C. Jones	Salem township, O	Nov. 7, "
Straw, cutting, and corn sheller	William Denson	Morgan county, Ala.	May 2, "
Thrashing and cleaning grain	Alexander Porter	New Vineyard, Me	Jan. 23, "
Thrashing grain, &c.	John Gearheart	Rush township, Pa	Aug. 27, "
Thrashing and hulling grass seed	Samuel Gould	New Portland, Maine	Aug. 15, "
Thrashing, hulling, and shelling	Jesse S. Dick	Genesee co., N. Y	Mar. 13, "
Thrashing machine	Luke Hale	Hollis, N. H	Jan. 7, "
Thrashing machine	Joseph Ross	Boundbrook, N. J	Feb. 6, "
Thrashing machine	Thomas D. Burrall	Geneva, N. Y	Mar. 6, "
Thrashing machine	David G. McCoy	Dublin, Md	Mar. 20, "
Thrashing machine	William W. Ross	Chillisquaque t'p, Pa.	Mar. 30, "
Thrashing machine	Luther Carman	Oxford, Maine	April 2, "
Thrashing machine	William G. Johnson	Bridgetown, N. J	April 3, "
Thrashing machine	Samuel S. Allen	Saratoga Sp'gs, N.Y.	April 3, "
Thrashing machine	Henry Heberling	Harrison co., Ohio	April 8, "
Thrashing machine	James Whitehill	Frederick co., Md	Ap'l 22, "
Thrashing machine	S. C. Sneed and W. S. Carpenter	Albemarle co., Va.	May 9, "
Thrashing machine	Washington F. Pagett	White Post, Frederick county, Va	May 22, "
Thrashing machine	Edmund Warren	New York	May 29, "
Thrashing machine	Henry Johnson	Washington co., Ten.	May 29, "
Thrashing machine	William Laighton	Portsmouth, N. H	June 6, "
Thrashing machine	T. Rucker, Jr., assignee of P. Cheek	Murfreesboro', M.T.	June 12, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Thrashing machine	Joseph Tyler	Brooklyn, Conn	July 7, 1835
Thrashing machine, chaffing straw	Russel Bradley	Williston, Vt	Oct. 6, "
Thrashing machine, clover	John P. Ridings	Hillsborough, Ohio	June 19, "
Thrashing machine, clover, &c.	A. Burgess and H. Baldwin	Washington, Conn	Oct. 10, "
Thrashing machine, clover and rice	Moses Davenport	Philips, Maine	Oct. 6, "
Thrashing machine, portable	H. and J. W. Edgar	Wayne county, Ohio	June 6, "
Thrashing machine, for rice, &c.	William Mathews	Charleston, S. C	Aug. 27, "
Trees, &c., mode of felling	James Hamilton	New York	June 26, "
Washing potatoes and roots	William Ellis	Waterville, Maine	Feb. 25, "
Weevil, mode of destroying	James A. Lee, administrator of James Lee	Maysville, Ky	Aug. 17, "
Winnowing clover seed	Hiram Hoth	Weld, Maine	Sep. 26, "
Winnowing machine	Truman B. Brown	Locke towns'p, N.Y.	Mar. 6, "
Winnowing machine	Jeremiah Nichols	Kent county, Md	June 15, "
Winnowing machine	Edward P. Fitzpatrick	Mount Morris, N. Y.	Nov. 14, "

CLASS II.—METALLURGY *and Manufacture of Metals.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Awls, drills, &c., setting	Erastus B. Bidgelow and Stephen P. Brigham	W. Boylston township, Mass	Jan. 27, 1835
Bars, for grates and stoves	Jordan L. Mott	New York	Oct. 14, "
Brads, cutting, revolving	Asa B. Woods and Eb. Talbot, Jr	Windsor, Conn	Feb. 13, "
Brand	Eli Barnes, G. Hill and S. B. Hawkins	Ashtabula, Ohio	Feb. 25, "
Castings, chilled cylinders & cones	James Harley	Pittsburgh, Pa	Mar. 3, "
Castings, metallic pin for chilling the interior of	William H. Saunders	Greensburg, N. Y	Nov. 26, "
Castings, mould for iron pipes, &c.	John D. Morris	Kensington, Pa	Dec. 2, "
Castings, smoothing the oxide and sand on	Bradford Seymour	Utica, N. Y	Dec. 2, "
Door, wire springs for	John Codman	Boston, Mass	Aug. 17, "
Fire-proof chest	John Scott	83 Dock street, Philadelphia, Pa	July 21, "
Flasks and patterns for iron tea kettles	David Steward	Danville, Pa	June 26, "
Flat or sad iron, tenon and mortise attached	William Wilson	Greenfield, Mass	Mar. 27, "
Forges and bellows, for blacksmiths, &c.	John C. Conklin	Peekskill, N. Y	June 19, "
Forges, backs, blacksmiths	Isaac Sawyer	Hallowell, Me	Feb. 13, "
Forges, backs, blacksmiths	James Knickerbacer	Laporte, Ind	Sep. 26, "
Forge and other furnaces, application of air	S. W. Watson and C. Robinson	Ashtabula, Ohio	Sep. 26, "
Forge, hearth, hot air	L. V. Badger and R. Walker	Portsmouth, N. H	Nov. 30, "
Furnace, hot air, and cupola	L. V. Badger	Portsmouth, N. H	Dec. 2, "
Furnace, smelting ore and burning lime	John Owings	Adams county, Pa	May 29, "
Gold, amalgam mill for separating from ore	Joseph Curtis	New York	Dec. 28, "
Gold, amalgam mill for separating from ore	Joseph Curtis	New York	Dec. 28, "
Gold, amalgam mill for separating from ore	Joseph Curtis	New York	Dec. 28, "
Gold, extracting from ore, &c.	Nathaniel Bosworth	Philadelphia, Pa	June 6, "
Hinges and tubes	William Shaw	Buffalo, N. Y	Oct. 22 "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Hoes, manufacturing	Isaac Hinman	Hamden, Conn	Ap'l 22, "
Knobs, screw for glass	Orrin Newton	Pittsburgh, Pa	Oct. 17, "
Latch and lock, for doors	Albert Bingham	Unity, Me	July 7, "
Lock, door, and other fastenings	J. R. Campbell and H. C. Campbell	Charlestown, Mass	Dec. 28, "
Locks, mortise and latch	J. G. Hotchkiss	New Haven, Conn	June 19, "
Locking, number of drawers	Edward Brown	Lynchburg, Va	Oct. 28, "
Nails, machine, nippers for Reed's	Stephen Chubbuck	Wareham, Mass	Jan. 13, "
Nails, wrought	Samuel G. Reynolds	Providence, R. I	Mar. 18, "
Rolling metals	Isaac Hinman	New Haven, Conn	Ap'l 22, "
Saw teeth, cutting	Andrew T. Mervin	Borough of Muncy, Pa	Oct. 28, "
Saw set	Herrick Aiken	Middlesex, Mass	June 12, "
Saw set	Theodore Taylor	Port Deposite, Md	Aug. 15, "
Shoes, horse	Henry Burden	Troy, N. Y	Nov. 23, "
Shovel, scoop	John and Wm. Smith	Williamston, Mass	Feb. 25, "
Tin ware, seaming	James Redheffer	Bridgetown, N. J	Mar. 6, "
Trip hammer	Heman Redfield	Grafton, Mass	Mar. 6, "
Window blinds and door	Seril Steere	Gloucester, R. I	Mar. 25, "
Window sash, bolt and spring	Marcus Merriman, Jr	New Haven, Conn	Ap'l 14, "
Window sash, cast iron	James S. Stoddard	Macedon, N. Y	Oct. 14, "
Window sash, spring and catch	Menson L. Stevens	Waterbury, Conn	Jan. 9, "
Wrench, screw	Solyman Merrick	Springfield, Mass	Aug. 17, "

CLASS III.—MANUFACTURES *of Fibrous and Textile Substances, including Machines for preparing Fibres of Wool, Cotton, Silk, Fur, Paper, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cloth, dressing, calendering	Zenas Bliss	Johnston, R. I	Oct. 17, 1835
Cloth, manufacturing	Freeman Wolcott	Stow, Mass	July 21, "
Cloth, winding up	J. Goulding and R. Brackett	Boston, Mass	Nov. 30, "
Cordage, rope, laying	John Goulding	Boston, Mass	Oct. 10, "
Cordage, rope, serving	James Fales	New Bedford, Mass	Aug. 20, "
Doffer	Stephen H. Parkhurst	Providence, R. I	Oct. 10, "
Flax and hemp, breaking	Ferdinando Stith	Franklin, Tenn	Ap'l 22, "
Flax and hemp, preparing, &c	John Goulding	Boston, Mass	Aug. 17, "
Flax and hemp, and tow hatcheling	John Goulding	Boston, Mass	Oct. 10, "
Fulling mill, stocks, propelling	Elisha O. Norris	Monmouth, Me	July 7, "
Fur, cutting machine, reciprocating	Curtis M. Lampson	New York	Feb. 5, "
Fur, extracting hair from	Sam'l G. Ladd, assignee of Seth Graham	Farmington, Me	Mar. 27, "
Fur, substitute, for dressed fur skins	Allen Belden	Hudson, N. Y	Ap'l 22, "
Gin, cotton, boxing for	William S. Cooley	Norwich, Conn	Jan. 7, "
Gin, cotton, roller	William Whittimore, Jr.	W. Cambridge, Mass	May 29, "
Hair, extracting from skins	Nahum Swett	Redfield, Me	Nov. 14, "
Hat blocks	A. and S. Chichester	Wilton, Conn	May 29, "
Hats, bodies, stiffening	Henry Blynn	Newark, N. J	May 9, "
Hats, bonnets, &c	Elisha Pratt	Cambridge, Mass	May 16, "
Loom	Oliver C. Burr	Milbury, Mass	July 17, "
Loom, damask	Tompkins and Gilroy	N. Providence, R. I.	May 9, "
Loom, power	David Whitman	Windham, Conn	Mar. 20, "
Loom, power	William G. Gavit	Washington county, R. I	Ap'l 8, "
Loom, power, for silks	Gamaliel Gay	Poughkeepsie, N. Y.	Sep. 26, "
Loom, power, and taking up motion	Amasa Stone	Johnston, R. I	Aug. 17, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Loom, power, weaving stock frames	F. Goodell and F. H. Harvey	Ramapo, N. Y	Dec. 2, 1835
Loom, reeds, heddles or harness	Jeptha A. Wilkinson	Providence, R. I	July 17, "
Loom, weaving, figured goods	John Smith	Shaefferstown, Pa	Ap'l 22, "
Loom, weaving, stocks	Conrad Kile	Erie, Pa	Sep. 18, "
Napping, cloth	Reuben Daniels	Woodstock, Vt	June 26, "
Paper machine	John Ames	Springfield, Mass	Feb. 20, "
Silk, throwing or twisting	Lucillias H. Mosely	Poughkeepsie, N. Y.	May 9, "
Silk, unwinding	Gamaliel Gay	Poughkeepsie, N. Y.	Aug. 17, "
Spinning, accelerated	Leonard Norcross	Dixfield, Me	June 15, "
Spinning, hemp and flax	Andrew Caldwell	Lexington, Ky	Aug. 20, "
Spinning, roping, and doubling cotton, silk, &c	James Jones	Manchester, Eng	May 16, "
Spinning, speeder, double	William Field	N. Providence, R. I.	Oct. 6, "
Spinning, spindle, dead	Henry G. Davis	Northborough, Mass.	Sep. 9, "
Spinning, spindle, rotary and stationary	Charles Jackson, St. S. Potter and John Miller	Providence, R. I	Ap'l 2, "
Spinning and twisting, straw, hay, &c	Philo G. Sheldon	Winchester, Conn	Ap'l 8, "
Tenter bars, circular	Stephen R. Parkhurst	Worcester, Mass	Oct. 28, "
Whipper, cotton, oblique	Lucien Osgood	Abbington P. O., Ct.	Oct. 27, "
Wool, cleaning	Michael H. Simpson	Boston, Mass	July 7, "
Wool, combing	Samuel Cauillard, Jr	Boston, Mass	July 7, "
Wool, or flax, to brush into teeth	William W. Calvert	Lowell, Mass	Sep. 18, "

CLASS IV.—CHEMICAL PROCESSES, MANUFACTURES, AND COMPOUNDS, *including Medicine, Dying, Color-making, Distilling, Soap and Candle making, Mortars, Cements, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Alcohol, extracting from apples	Anson Wolcott	E. Bloomfield, N. Y.	Oct. 6, 1835
Anodyne, and alterative syrup	Rezin Thompson	Rome, N. Y	Nov. 14, "
Bleaching cloth, and cleaning	Calvin H. Farnham	Norwich, Conn	Aug. 15, "
Candle wick, dipping and cutting	Willard Morey	Worcester, Mass	Aug. 15, "
Caoutchouc, spreading and drying upon cloths	William Atkinson	New York	Oct. 6, "
Cement, for blocks, pillars, &c	Charles Clinton	Minnisink, N. Y	Oct. 28, "
Cement, for cisterns	Roberts and Carson	New York	Oct. 17, "
Cement, gum-elastic	Charles Goodyear	New Haven, Conn	Sep. 9, "
Cement, hydraulic	Parker, Clowes and Garfield	New York	Aug. 27, "
Cement, hydraulic	Obadiah Parker	New York	Sep. 9, "
Composition, for medical purposes	Robert S. Bernard	Norfolk, Va	Aug. 17, "
Composition, pencils, points, &c	Guy C. Baldwin	Ticonderoga, N. Y	Dec. 2, "
Composition, to prevent absorption of animal and fish oils	Nathan Hathaway	Fairhaven, Conn	May 22, "
Composition, supplying lamps	Henry Porter	Bangor, Maine	April 8, "
Composition, water proof, for roofs	Lyman Garfield	Troy, N. Y	Feb. 20, "
Distilling apparatus for spirits of turpentine	Josiah Jennings	New York	Aug. 27, "
Dyeing, with alkaline prussiates	Felix Fossard	Philadelphia, Pa	Nov. 7, "
Dyeing and printing woolen cloths	William Duncan	Bellville, N. Y	Sep. 18, "
Galvanic electricity, to cure diseases	Daniel Harrington	Philadelphia, Pa	Mar. 31, "
Galvanic electricity, applied to the surface of the human body	Daniel Harrington	Philadelphia, Pa	April 8, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Glue, manufacturing	Jonathan Morgan	Portland, Maine	Sep. 18, 1835
Ink, writing	John D. Myers	New York	Sep. 26, "
Japan, applied to leather	William Gates	Hanover, N. Y.	Nov. 14, "
Mead, composition	T. T. Kimball and A. H. White	Dedham, Mass.	Sep. 26, "
Oil of hazze, preparation of	Preswick and Fisher	New York	Aug. 17, "
Oil, linseed, substitute for	Todd and Peabody	Washington, D. C.	July 7, "
Ointment, cure of diseases	William Waller Gray	Richmond, Va.	Mar. 18, "
Paint, composition, metallic oxide for white	Forest Sheppard	Fredericksburg, Va.	Mar. 18, "
Potash, manufacturing	Hartsuff and French	Aurelius, N. Y.	July 17, "
Potash, manufacturing and leaching ashes	Elijah Williams	Harbor Creek, Pa.	Aug. 16, "
Salts, manufacturing, by solar evaporation	Edward C. Cooper	New York	May 16, "
Sugar, boiling, &c., under a vacuum	John Steel, Jr.	New York	Oct. 27, "
Sugar, moulds for loaf	Charles Duncan	Williamsburg, N. Y.	Oct. 27, "
Vinegar, mode of making	Frederick N. Boden	N. Lancastor, Ohio.	July 6, "
White and whiting, Paris	Peter Ferris	Greenwich, Conn.	Ap'l 22, "

CLASS V.—CALORIFIC, *comprising Lamps, Fire-places, Stoves, Grates, Furnaces for Heating Buildings, Cooking Apparatus, Preparation of Fuel, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Asbestos, use and application of, to stoves, grates, crucibles, &c.	John Scott	Philadelphia, Pa.	Nov. 26, 1835
Baker, tin	Nathaniel D. Whiten	New York	Oct. 10, "
Blower, spiral cone	Benjamin Brundred	Oldham, N. J.	Sep. 26, "
Boiler, kitchen	J. and W. C. Bailey	Farmington, Me.	May 22, "
Boiler, portable	Anson W. Spencer	Cazenovia, N. Y.	June 19, "
Charcoal burner, conical arch	Ezra B. Gilbert	Euphrata, N. Y.	Nov. 7, "
Chimneys and fire places	Moses Perin	Connersville, Ind.	Sep. 26, "
Coal, anthracite, cracking	Jonathan S. Hubbel	New York	Aug. 17, "
Cooking, applying the reflection of caloric	John Burch	Jefferson co., N. Y.	Ap'l 22, "
Cooking, ranges	Thomas B. Smith	New York	Aug. 27, "
Cooking stove	Paul Wing	Grafton, Mass.	Feb. 25, "
Cooking stove	Andrew Abbott	Portland, Me.	April 2, "
Cooking stove	Thaddeus Fairbanks	Caledonia co., Vt.	Ap'l 14, "
Cooking stove	Resor, Wade and Resor	Cincinnati, Ohio.	May 29, "
Cooking stove	Elijah Skinner	Sandwich, N. H.	June 12, "
Cooking stove	Legrand Fairman	Orleans co., N. Y.	June 26, "
Cooking stove	Thomas D. Burrall	Geneva, N. Y.	June 26, "
Cooking stove	Solomon Dickinson	Richmond, Ind.	Aug. 15, "
Cooking stove	Ezekiel Gore, Jr.	Gilford, Vt.	Aug. 17, "
Cooking stove	Edward N. Kent	Portland, Me.	Aug. 17, "
Cooking stove	J. Whiting and J. Mears	Boston, Mass.	Sep. 9, "
Cooking stove	Ezekiel Daboll	N. Canaan, Conn.	Sep. 26, "
Cooking stove	Elnathan Sampson	Pierpont, N. Y.	Oct. 10, "
Cooking stove	Horatio B. Wade	Cincinnati, Ohio.	Oct. 17, "
Cooking stove	Bennington Gill	New York city	Dec. 9, "
Cooking stove, baking	Hiram G. Phelps	Johnstown, N. Y.	May 29, "
Cooking stove, correcting bad smell	Eliphalet Nott	Schenectady, N. Y.	Jan. 7, "
Cooking stove and fire place	Joshua Douglass	S. Durham, Me.	Nov. 14, "
Cooking stove, flat	Joel Rathbone	Albany, N. Y.	Mar. 6, "
Cooking stove, and Franklin	Isaac McNavy	Stafford, Conn.	Mar. 24, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cooking stove, plain, plate or box	Eliphalet Nott	Schenectady, N. Y.	Ap'l 22, 1835
Cooking stove, portable	John Igget	Albany, N. Y.	Jan. 16, "
Cooking stove, reflection of caloric	John Burch	Jefferson co., N. Y.	Ap'l 22, "
Cooking stove, salamander	Abraham D. Spoor	Coxsackie, N. Y.	Jan. 7, "
Cooking stove, self-heat retaining	Moffat & Taintor	Buffalo, N. Y.	July 17, "
Cooking stove, three boiler, flat	Sylvester Parker	Troy, N. Y.	Jan. 16, "
Cooking stove, and warming room	Ernst G. Augustin	New York	July, 6, "
Fire, alarm	B. Seymour & J. Whipple	Utica, N. Y.	Ap'l 2, "
Fire, draught, &c.	Robert Mayo	Washington, D. C.	Sep. 9, "
Fire-place	Skinner and Bean	Sandwich, Conn.	June 12, "
Fire-place	Ebenezer S. Greeley	Dover, Me.	Oct. 6, "
Fire-place and chimney	Reuben Bacon and Elijah Harris	Boston, Mass.	Ap'l 8, "
Fire-place and chimney, funneled	Ansel Gerrish	Shapleigh, Me.	Jan. 23, "
Fire-place, cooking and baking	John C. Howard	Howard's Valley, Ct	Oct. 27, "
Fire-place, for grates	Joseph Snyder	Philadelphia, Pa.	June 12, "
Fire-place, and grate	Charles Lane	Hingham, Mass.	Dec. 15, "
Fire-place, sheet iron	Gilbert Richards	Ashfield, Mass.	Nov. 26, "
Furnaces, adjustment of, &c.	Eliphalet Nott	Schenectady, N. Y.	Ap'l 22, "
Furnaces, for anthracite	M. Brook Bulkley	Pottsville, Pa.	Jan. 16, "
Furnaces, and bake-oven	Charles E. Russell	Philadelphia, Pa.	Feb. 13, "
Grates	Barnabus Pike	New York	Mar. 11, "
Grates, stoves and furnaces	Elias W. Newton	Middletown, Conn.	Jan. 9, "
Grates and stoves, parlor and kitchen	Elkanah Ingalls	Providence, R. I.	Ap'l 22, "
Gridirons, rotary	Kellogg Strong	Mendon, Conn.	Oct. 28, "
Kiln for drying grain	Thomas Crook	New Hope, Pa.	Nov. 20, "
Kitchen ranges	Eliphalet Nott	Schenectady, N. Y.	Ap'l 22, "
Lamp-wicks, raising and lowering	Samuel Rust	New York	Oct. 6, "
Ovens, baking and heating houses	Jacob Baldwin	New York city	Oct. 27, "
Ovens, construction and application	Samuel Pollard	Bucksport, Me.	June 12, "
Ovens, portable	Charles Vale	Newark, N. J.	June 26, "
Slabs, for fire-brick and stoves, lining, &c.	Joseph Putnam	Salem, Mass.	Aug. 20, "
Stoves	George J. Payne	Boro' of Erie, N. Y.	Mar. 6, "
Stoves	Jordan L. Mott	New York	July 21, "
Stoves	Daniel West and Ferdinand Von Sickle	Hudson, N. Y.	July 21, "
Stoves, anthracite coal	Jacob J. Janeway	N. Brunswick, N. J.	Jan. 27, "
Stoves, anthracite, wrought iron for	Thomas M. Southwick	Troy, Conn.	June 6, "
Stoves, covering the rods used to bind	John C. Parry	Pittsburgh, Pa.	June 12, "
Stoves, and fire places	Daniel Sutherland	Lisbon, Maine	Oct. 31, "
Stoves, furnace	Harvey Hubbard	Berlin, Conn.	Mar. 25, "
Stoves, furnace	James Atwater	New Haven, Conn.	June 20, "
Stoves, and grates	Elkanah Ingalls	Providence, R. I.	Ap'l 22, "
Stoves, heating apartments	Charles W. Peckham	New Haven, Conn.	May 16, "
Stoves, heating irons for tailors' and hatters' use	John Lewis	Derby, Conn.	Aug. 17, "
Stoves, knobs or handles	Jordan L. Mott	New York	July 21, "
Stoves, manufacturing	Elias W. Newton	Middletown, Conn.	Jan. 9, "
Stoves, stone coal	Philip Benedict	Lancaster, Pa.	Oct. 27, "
Warming buildings by radiated and steam heat, &c.	Robert Rogers	South Berwick, Me.	June 12, "

CLASS VI.—STEAM AND GAS ENGINES, *including Boilers and Furnaces therefor, and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Boilers, steam	J. F. C. Salmon	Philadelphia, Pa	Oct. 17, 1835
Boilers, steam	Thomas Ashcroft	Boston, Mass	Nov. 23, "
Boilers, steam, and furnace for boats	E. Nott	Schenectady, N. Y.	Ap'l. 22, "
Boilers, steam, feeding	Hunsicker and Krauss	Northampton, Pa	Aug. 30, "
Boilers, steam, pipes, &c	John Goulding	Boston, Mass	June 19, "
Boilers, steam, regulating height of water in	Jesse Fox	Lowell, Mass	April 2, "
Boilers, steam, regulating height of water in	Thomas Odiorne	Malden, Mass	Sep. 26, "
Explosion, steamboats, mills, &c	George R. Clarke	Rochester, N. Y	July 7, "
Float, rotary, spiral springs, for steam engines	Mason Young	Buffalo, N. Y	July 21, "
Gauge, steam, for preventing the explosion of boilers	Samuel Raub, Jr	Wilkesbarre, Pa	Dec. 28, "
Heat, economy of, in generating steam	Tunis V. Le Roy	Newport, N. Y	Aug. 17, "
Pistons, steam engines for	Wright and Ketchum	Calhoun co., M. T.	July 19, "
Spark catcher	Alfred C. Jones	Portsmouth, Va	Aug. 27, "
Spark catcher	Haut C. Wyatt	Weldon, N. C	Oct. 15, "
Spark catcher	George Holbrook	Boston, Mass	Nov. 23, "
Spark catcher	James W. Wapples	Wilmington, Del	Nov. 30, "
Steam engine	John Murphy	Philadelphia, Pa	Mar. 24, "
Steam engine	Job Sheldon	New Haven, Conn	Mar. 24, "
Steam engine	John Bennack	Orono, Maine	Sep. 9, "
Steam engine, centrifugal, pneumatic	Charles C. Conway	New York	Nov. 14, "
Steam engine, locomotive	Charles & George Sellers	Philadelphia, Pa	May 22, "
Steam engine, locomotive, wheels, and boiler, tubes for	M. W. Baldwin	Philadelphia, Pa	April 3, "
Steam engine, locomotive, wheels, and boiler, tubes for	M. W. Baldwin	Philadelphia, Pa	Aug. 17, "
Steam engine, rotary	George M. Allsop	Philadelphia, Pa	Feb. 20, "
Steam engine, rotary	Orson Barnes	Van Buren, N. Y	June 26, "
Steam engine, rotary	Arnold Buffum	Philadelphia, Pa	Oct. 10, "
Steam engine, rotary and boiler	Ethan Baldwin	Washington, D. C	Jan. 13, "
Steam engine, rotary, rarefied air	George Cameron	Washington, D. C	Aug. 17, "
Steam engine, rotary, re-acting	Charles Hill	Zanesville, Ohio	June 26, "
Steam engine, rotary, re-acting	J. G. Hotchkiss	New Haven, Conn	Nov. 7, "
Steam, generating	William Scarbrough	Savannah, Ga	April 8, "
Steam power	Elisha Bates	Mt. Pleasant, Ohio	July 27, "
Steam power and boiler	Benjamin Gates	Ontwa t'p, M. T	Mar. 24, "
Steam wheel	William Wilson	Henderson co. Tenn.	Mar. 13, "
Valve, for boilers and cam	John Kirkpatrick	Baltimore, Md	May 29, "
Valve, engines	John Kirkpatrick	Baltimore, Md	May 29, "
Valve, sliding	Andrew M. Eastwick	Philadelphia, Pa	July 21, "

CLASS VII.—NAVIGATION *and Maritime Implements, comprising all Vessels for conveyance on water, their construction, rigging and propulsion, Diving Dresses, Life Preservers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Anti-friction wheels, applicable to steamboats	Julian Nicolet	Pittsburgh, Pa	June 12, 1835
Bending mast and truss hoops	Jonathan Mulford	North. Liberties, Pa.	Jan. 16, "
Block sheaves, friction bushes or boxes for	Lewis Aspinwall	Albany, N. Y	Apr. 22, "
Boats, canal and rivers	Anthony Plantou	Philadelphia, Pa	Mar. 18, "
Boats, canal, sheet iron, twin	Luman Parmelee	Poughkeepsie, N. Y.	Nov. 26, "
Boats, canal, transhipment of merchaudize	James O'Conner	Philadelphia, Pa	Oct. 14, "
Boats, fishing	John Donn	Washington, D. C	Mar. 6, "
Capstans, for ships	Calvin Oaks	Rochester, N. Y	May 16, "
Constructing ships	Charles Olcott	Medina, Ohio	Aug. 15, "
Disengaging horses in navigating canals	Gotlieb Shultz	Philadelphia, Pa	Sep. 9, "
Diving dress	John R. Campbell	Boston, Mass	Nov. 30, "
Gum elastic, applying to vessels	George Duncan Cooper	New York	Jan. 7, "
Harpoon	Dexter H. Chamberlain	Boston, Mass	Aug. 17, "
Mast and truss hoop, bending	Jonathan Mulford	North. Liberties, Pa.	Jan. 16, "
Propelling boats, screw for	Edward P. Fitzpatrick	Mount Morris, N. Y.	Nov. 23, "
Propelling boats, by screw wheel, &c	John L. Smith	Charleston, S. C	Sep. 18, "
Propelling paddles for boats	Philip E. Barbour	Louisville, Ky	Jan. 27, "
Propelling paddle wheels, &c., &c.	Benjamin M. Smith	Rochester, N. Y	May 22, "
Propelling steamboats, canal	John Elgar	Baltimore, Md	Nov. 7, "
Propelling steamboats and other vessels	William Scarborough	Savannah, Ga	April 8, "
Propelling wheels for steamboats	Nehemiah Dodge	New York	Feb. 25, "
Raising vessels, sunken, &c	W. Atkinson and E. Hale	New York	Dec. 2, "
Steamboat anti-friction wheels	Julian Nicolet	Pittsburgh, Pa	June 12, "
Steamboat for canals	John Elgar	Baltimore, Md	Nov. 7, "
Ventilating bellows, for ships, &c.	James Barron	Philadelphia, Pa	Feb. 20, "

CLASS VIII.—MATHEMATICAL, *Philosophical and Optical Instruments, including Clocks, Chronometers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Clocks and time pieces	William Pardee	Albany, N. Y	May 22, 1835
Clocks and time pieces, propelling, by atmospheric air	Andrew Morse, Jr	Bloomfield, Me	Sep. 18, "
Compass, mariner's	Jonathan Ball	Buffalo, N. Y	Mar. 6, "
Compass, surveying, or circumferenter	Samuel R. Miller	Front Royal, Va	Oct. 22, "
Escapement, for clocks	James Fulton	Shelby county, Ky	Dec. 30, "
Level pendulum	Asahel Munger	Oberlin, Ohio	Aug. 17, "
Theodolite or compass	James Eames	Newry, Me	Feb. 11, "
Theodolite	Samuel Stone	Long Green, Balto., Md	June 6, "

CLASS IX.—CIVIL ENGINEERING *and Architecture, comprising works on Rail and Common Roads, Bridges, Canals, Wharves, Docks, Rivers, Wiers, Dams, and other Internal Improvements, Buildings, Roofs, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Boring rocks	Aaron W. Vancleve	Stonington, Conn	Dec. 2, 1835
Bridges	ithiel Town	New York	April 3, "
Bridges	George Law	Easton, Pa	June 12, "
Bridges	Richard T. L. Witty	Lowell, Mass	Oct. 14, "
Canals, transportation on, and rail roads.*	John Elgar	Baltimore, Md	Nov. 7, "
Canals, locks, gate	David Wilkinson	Cahoes, N. Y	Aug. 17, "
Chains and ropes, used on canals and rail roads	John M. Palisse and Sidney S. Durfee	Hudson, N. Y	Feb. 25, "
Dock, floating, dry	[illegible] Hawes	Cayuga co., N. Y	Ap'l 22, "
Dock, floating, dry	Rufus Porter	Billerica, Mass	Nov. 14, "
Dock, floating, dry	J. R. Campbell and J. S. Withington	Boston, Mass	Nov. 28, "
Doors, &c., closing	Oliver Davidson	Ballston Spa, N. Y	Mar. 30, "
Excavating and removing earth	Nathan Currier	Methuen, Mass	May 29, "
Marine railway	Washington Van Dusen	Kensington, Philadelphia co., Pa	Ap'l 14, "
Railroad	Elisha Johnson	Rochester, N. Y	Nov. 23, "
Railroad curves, construction of	Roswel Bourne	Lancaster, Mass	Oct. 10, "
Railroad platform, revolving	John Tustin	Philadelphia, Pa	Sep. 9, "
Railroad, preventing, turning	David Evans	Penn township	Nov. 26, "
Railroad, running gear for	George W. Cleveland	Baltimore, Md	Oct. 14, "
Railroad, self-adjusting	W. T. James	New York	Oct. 27, "
Railroad, turning short curves	James Stimpson	Baltimore, Md	Sep. 26, "
Roads, constructing	Thomas Earle	Burlington, N. J	Oct. 14, "
Roads, constructing with cement	Joseph Robey, Jr	Albany, N. Y	Aug. 17, "
Roofs, covering with tin, &c	John Bouis	Baltimore, Md	June 26, "
Roofs, covering with tin, &c	Charles Bonnycastle	Leesburg, Va	Aug. 17, "
Roofs, covering with tin, &c	Phineas Burgess	Brooklyn, N. Y	Oct. 17, "
Stone eradicator	John C. Blauvelt	Newton, Conn	Mar. 2, "
Stumps, extracting	Henry Gordon	Fountain Dale, Pa	Jan. 16, "
Stumps and rock, extracting	Leonard Norcross	Dixfield, Me	June 15, "
Window and door blinds	Sevil Steere	Gloucester, R. I	Mar. 25, "

* Extended, surrendered, and re-issued under the title of "method of attaching sectional boats to each other by means of a rule joint."

CLASS X.—LAND CONVEYANCE, *comprising Carriages, Cars and other Vehicles used on roads and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Axletrees, diminishing friction	Benjamin Hinckley	Fayette, Kennebec county, Maine	Ap'l 14, 1835
Axletrees and wheels	Aaron Hale	Boston, Mass	April 2, "
Brakes, for cars	John K. Smith	Port Clinton, Pa	Dec. 2, "
Car, railroad	John Withers	Bart township, Pa	Mar. 25, "
Car, railroad, easing the shock in stopping	Charles Davenport	Cambridge, Mass	Sep. 9, "
Car, railroad, frame for	Heinrich Bachman	Lancaster, Pa	May 2, "
Car, railroad, turning with facility	Anthony Shermer	Philadelphia, Pa	Sep. 9, "
Car, railroad, and wagon, &c	James Herron	Richmond, Va	Mar. 25, "
Carriages, and machinery, when wheels are used	Williams and King	Hartford, Conn	May 16, "
Carriages, measuring distance	Richardson and Fuller	Brunswick, Maine	May 29, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Carriages, (wheeled) sustaining weight, &c	Samuel Chapman	Windsor, Mass	Mar. 2, 1835
Coaches, panels	Eben A. Lester	Boston, Mass	Mar. 18, "
Springs, carriage	Henry Pace, Sen	Cincinnati, Ohio	Oct. 14, "
Springs, carriage, gig, &c., connecting	Amos Davis	Easton, Md	Mar. 18, "
Wheels and axles	Aaron Hale	Boston, Mass	April 2, "
Wheels, felloes, bending	Edward Reynolds	Haddonfield, N. J	July 17, "
Wheels, felloes, cutting machine	J. S. Brown and Jacob J. Barker	Philips, Maine	Oct. 14, "
Wheels, felloes, cutting machine	W. Bradley and M. L. Worthley	Philips, Maine	Oct. 14, "
Wheel hubs, box setter for boring in, &c	Edward Badlam, Jr	Chester, Vt	Sep. 18, "
Wheel hubs and rotary bearings, anti-friction boxes	E. Fisk and J. C. Green	Fayette, Maine	Nov. 14, "
Wheels for rail-road cars	John Baker	Lancaster, Pa	Mar. 20, "
Wheels for rail-road cars, constructing	Arundius Tiers	Kensington, Pa	Dec. 2, "
Wheels, spokes, cutting tenons on	William Gerrish	Portsmouth, N. H	July 21, "

CLASS XI.—HYDRAULICS AND PNEUMATICS, *including Water-wheels, Wind-mills, and other implements operated on by Air or Water, or employed in raising and delivering Fluids.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Air, condensed, for propelling boats, cars, &c	Alexander McGrew	Cincinnati, Ohio	Oct. 27, 1835
Cistern, reservoirs, vats, &c	Levi Kidder	New York	Nov. 14, "
Cistern, water, &c	Alfred Palmer	Syracuse, N. Y	Dec. 15, "
Engine, fire	Thomas Odiorne	Portsmouth, N. H	Aug. 27, "
Engine, fire, pump for	Henry Gates	Northampton, Mass	June 12, "
Hydrants	S. T. Walker	Baltimore, Md	Nov. 26, "
Hydrostatic and pneumatic machine for propelling	Robert Mills and Henry B. Fernald	Washington, D. C. and Portland, Me	Oct. 10, "
Pumps	Heinrich Bachman	Lancaster, Pa	April 2, "
Pumps	Amos Miner	Jordan, N. Y	July 7, "
Pumps	Joseph Redelsperger	Mansfield, N. J	Oct. 31, "
Pumps, air	Charles Goodyear	Philadelphia, Pa	Mar. 30, "
Pump, double acting cylinder	Phelps Mix	Germantown, Pa	Jan. 9, "
Pump, forcing, double	William Douglass	Middletown, Conn	Aug. 20, "
Pump, rotary	William C. Trowbridge	Southeast, N. Y	Jan. 27, "
Pump, rotary	Isaac Hall	Poughkeepsie, N. Y	Ap'l 22, "
Pump, rotary	David M. Walker	Cavendish, Vt	Aug. 15, "
Pump, rotary	C. Peters and B. Dean	Poughkeepsie, N. Y	Oct. 31, "
Pump, for ships, &c	Thomas Odiorne	Portsmouth, N. H	Aug. 27, "
Raising water to set machinery in motion	David W. Hunt	Newburyport, Mass	June 12, "
Tide power	Henry B. Fernald	Portland, Maine	Aug. 17, "
Water power, application to mills	Wood and Dart	Fabius, N. Y	Sep. 9, "
Water wheel	Robert Eastman	Concord, N. H	Mar. 11, "
Water wheel	Alvin Darling and Barton Darling	Billingham, Mass	Ap'l 3, "
Water wheel	William Merril	Randolph, Ohio	May 16, "
Water wheel	Isaac Powell	Lawrence, N. Y	July 17, "
Water wheel, inclined, &c	Thomas Pierce	Hartwick, N. Y	May 2, "
Water wheel, re-acting	John B. McCord	Galena, Ill	May 16, "
Water wheel, tub	Edward Newman	Stilesville, Ind	Nov. 26, "
Water wheel, undershot	Ebenezer Cochran	Gibson county, Ind	June 15, "

CLASS XII.—LEVER, SCREW, *and other Mechanical Power as applied to Pressing, Weighing, Raising, and Moving Weights.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Balance	Nereston Griffing	New York	Apr. 8, 1835
Balance, for counters, &c	Elias Hibbard	Lunenburg, Vt	Nov. 7, "
Balance, platform	Alexander Bliss	Benson, Vt	June 12, "
Balance, platform, double lever scale	E. A. and A. Hibbard	Lunenburg, Vt	May 29, "
Balance, platform, scale for weighing,	Jesse Marden	Baltimore, Md	Sept. 9, "
Balance, steelyards	Christopher F. Dahl	Pittsburgh, Pa	Oct. 31, "
Balance, weighing machine	J. G. Röhr, assignee of Baptiste Maug	New York	Apr. 22, "
Lever, crank, weight, balance wheel, combination of	Elias T. Merrill	Parkman, Me	Apr. 22, "
Lever power, engine and self-regulating combined pendulum	Sidney Woods	Freeport, Me	Jan. 7, "
Packing flour	John Hinman	Hartley Tp., Pa	Mar. 2, "
Press, cheese	David Phelps	Bangor, Me	June 12, "
Press, cheese, self-adjusting	Rufus Porter	Billerica, Mass	Feb. 6, "
Press, cotton and hay, &c	Alexander J. Murray	Annapolis, Md	Jan. 9, "
Press, cotton and hay, &c	Eleazer Eliason, jr.	Fredericksburg, Va	Jan. 21, "
Press, cotton and hay, &c	Samuel T. Baker	West Gorham, Me	Mar. 20, "
Press, cotton and hay, &c	E. and L. L. Macomber	Gardiner, Me	Aug. 15, "
Press, lever	Jonathan Payne	Russellville, Ky	Sept. 9, "
Press, screw	Thomas Gilpin	Wilmington, Del	Apr. 3, "
Press, tobacco	John W. Weems	West River, Md	Dec. 15, "
Press, tobacco flattener	Emanuel Shoavler	Richmond, Va	Apr. 22, "
Pressing and raising weights, &c	Alonzo S. Greenville	Cambridgeport, Mass	Dec. 30, "
Windlass, ship's,	Seth Adams	Boston, Mass	Feb. 6, "

CLASS XIII.—GRINDING MILLS, *and Mill-gearing, containing Grain Mills, Mechanical Movements and Horse-Powers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bands, spiral wheel	Samuel S. Walley	Chester, Pa	Aug. 17, 1835
Cider mill, cast iron	Philip Pryer	Genesee co., N. Y	May 29, "
Coffee mill, &c	E. Morse and C. Putnam	Knoxville, Tenn	Sept. 9, "
Coffee mill and pepper, &c	David Richmond	McArthurstown, O	Oct. 14, "
Cooler, flour	Catlin, Hebard & Abell	Pomfret, N. Y	May 22, "
Cooler, flour, sifter, grain	Armstrong & King	New York	May 9, "
Corn, grinding and cotton seed	James Martin	Petersburgh, Va	May 16, "
Corn, grinding and crushing	Andrew P. H. Jordon	Madisonville, Tenn	Oct. 28, "
Corn, grinding and shelling	Geo. M. Weaver	Montgomery co., Pa	June 12, "
Gearing mills	Claverius Coleman	Barry's Bridge, Va	Aug. 27, "
Grist mill	H. P. Nuckols and Pouncy Nuckols	Barron county, Ky	Jan. 21, "
Grist mill	John R. Sleeper	Philadelphia, Pa	Jan. 27, "
Grist mill	Adna L. Norcross	Hallowell, Me	Aug. 20, "
Grist mill	Philip Hauser	Cincinnati, Ohio	Nov. 7, "
Grist mill	Samuel Hyde	Malone, N. Y	Nov. 26, "
Grist mill	Owen Moses	Malone, Franklin co. N. Y	Sept. 26, "
Grist mill, and chopping grain	Pierson Cope	Washington t'p, Pa	Aug. 17, "
Grist mill, constructing	Elisha Holton	Westminster, Vt	Apr. 3, "
Grist mill, family	Peter M. Wright	New York	Apr. 14, "
Grist mill, and grinding paints, snuff, &c	William S. Johnson	New York	June 26, "
Grist mill, and grinding paints and plaster	Cephas Manning	Littleton, Mass	Apr. 2, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Grist mill, and sawing, constructing	Geo. and F. R. Baker	Tuscaloosa, Ala	July 7, 1835
Grist mill, with small stones	Frederick Smith	Evans, N. Y	Mar. 18, "
Horse power	Irby Jones	Natchez, Miss	Jan. 13, "
Horse power	William E. Arnold	Chatham, Conn	Mar. 13, "
Horse power	C. Custer and Dan Ponepacker	Providence t'p, Pa	Mar. 30, "
Horse power	Thomas Mitchell	Newburg, N. Y	July 7, "
Horse power	Benjamin Wales	Hallowell, Me	Aug. 17, "
Horse power	Moses Davenport	Phillips, Me	Oct. 10, "
Horse power	Asa Trahern, H. Heberling, Wm. E. Lukens and Jno. Heberling	Harrison co., Ohio	Oct. 28, "
Horse power, endless chain	Webber Furbish	Hallowell, Me	Apr. 14, "
Horse power, endless leather	Jonathan G. Stanley and James C. Howard	Winthrop, Me	Jan. 16, "
Horse power, portable	Samuel S. Allen	Saratoga Sp'gs, N. Y.	Apr. 3, "
Horse power, portable	John Brandon	Williamsport, Pa	Apr. 8, "
Mill metallic file, furrowing, dressing	Samuel G. Reynolds	Providence, R. I	Mar. 18, "
Mill stones, dressing	David P. Napier	Casey county, Ky	Sept. 18, "
Pendulum power	Abraham Wade	Eagletown, N. Y	Mar. 25, "
Power, augmenting, engine	Andrew Oehler	Eastonville, Va	Mar. 30, "
Power, by weights, &c	Elisha Turner	North Pownall, Me	June 12, "
Power, propelling by cams and inclined planes	Philo C. Curtes	Utica, N. Y	May 29, "
Power, propelling machinery	David Russell	Tuscumbia, Ala	Oct. 27, "
Power, propelling machinery, called lever and dead weights	Luke M. Edwards	Trenton, Tenn	Mar. 2, "
Power, propelling mills by weights, &c	Obed R. Marston	Java, N. Y	Jan. 9, "
Spindle and bush, ring and ball, for mills	Warren P. Wing	Greenwich, Mass	Feb. 20, "
Spindle, oil bush	Jesse Hinman	Clinton town'p, Pa	Mar. 2, "

CLASS XIV.—LUMBER, *including Machines and Tools for Preparing and Manufacturing; such as Sawing, Planing, Mortising, Shingle and Stave, Carpenters' and Coopers' Implements.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Auger	William Jones	Portsmouth, Va	June 12, 1835
Auger	William Jones	Portsmouth, Va	June 15, "
Auger, or bit	Ezra L'Hommedieu	Saybrook, Conn	Feb. 11, "
Auger, for boring large holes	Nicholas J. Lampman	Coxsackie, N. Y	April 8, "
Auger and gimlets	Orville Percival	East Haddam, Conn.	Oct. 14, "
Barrels, manufacturer	John Squier	Salina, N. Y	Jan. 21, "
Bungs, cutting	George D. Gates	Hartford, Conn	May 2, "
Coopering, working off tool	Melancthon Sutton	Penfield, N. Y	Sep. 9, "
Grooving plane	James Herman	Lancaster, Ohio	Aug. 27, "
Hoops, and barrels, dressing	Kimball, Perry and Spaulding	Peterborough, N. H.	Sep. 18, "
Hoops, truss, making	Tristram Burgess and Simon Burgess	Livonia, N. Y	Jan. 21, "
Lathe, cooper's	Isaac Hoover	Miamisburg, Ohio	July 2, "
Lathe, turning irregular forms	Cullen Whipple, J. Sprague and Milton T. Whipple	Douglass, Mass	April 3, "
Lathe, turning rake handles	James Haven	Newport, N. H	Oct. 14, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Lathe, turning machine for rake teeth	Giles Dayton and William Stedman	Blanford and Springham, Mass.	Jan. 13, 1835
Laths, cutting	David M. Cradit	Ithica, N. Y.	May 22, "
Laths, splitting and cutting	Barnabus Langdon	Troy, N. Y.	Dec. 15, "
Mortising machine	Grove Bradley	Auburn, N. Y.	Feb. 25, "
Mortising machine	Jonathan Page	Henniker, N. H.	June 12, "
Mortising machine	Israel J. Richardson	Palmyra, N. Y.	July 7, "
Mortising machine	Imla Wright	Centre Antrim, N.H.	July 17, "
Mortising machine	Charles Gates	Centre Antrim, N.H.	Sep. 26, "
Mortising machine	John McBride	Richmond, Ind.	Nov. 26, "
Mortising chisel	Charles Rinehart	Marietta, Lancaster county, Pa.	April 8, "
Mortising chisel	George Page	Keene, N. H.	July 7, "
Mortising and tenoning	Francis M. Shaw	Brooklyn, N. Y.	April 8, "
Mortising and tenoning	Joseph H. Darby	Leominster, Mass.	June 15, "
Mortising and tenoning sash, doors and blinds	Ira Gay	Dunstable, N. H.	May 29, "
Pegs, shoe, splitting	Mark Wilder	Peterborough, N. H.	Aug. 15, "
Planing machine	Fisher Stedman	Aquackanock, N. J.	Aug. 17, "
Planing machine	Reid R. Throckmorton	New York	Oct. 6, "
Planing machine	Reid R. Throckmorton	New York	Oct. 22, "
Planing machine	McLaughlin and Hill	Sunderland, Vt.	Oct. 28, "
Planing machine, (improvement on Woodworth's)	Artemas L. Brooks	Lowell, Mass.	Jan. 7, "
Planing window sash	Ira Gay	Dunstable, N. H.	May 29, "
Rules, carpenter's joints	Lemuel Hedge	Brattleborough, Vt.	Ap'l 22, "
Saw, cutting timber	John Ruthven	New York	Nov. 30, "
Saw, for felling trees	James Hamilton	New York	June 26, "
Saw, use of	Aaron Field	Jericho, Vt.	Mar. 6, "
Saw mills	Ernst G. Augustine	New York	July 17, "
Saw mills	Linus Yale	Utica, N. Y.	Sep. 11, "
Saw mills	Uri Emmons	New York	Oct. 6, "
Saw mill carriage,	Henry Gordon	Adams county, Pa.	April 8, "
Saw mill, carriage	Samuel Phelps	Mount Morris, N.Y.	Sep. 18, "
Saw mill, constructing	Nath. & Pearson Crosby	Pomfret, N. Y.	Mar. 27, "
Saw mill, dog gauge	Martin Rich	Caroline, N. Y.	Mar. 27, "
Saw mill, dog block	Benjamin F. Snyder	Painted Post, N. Y.	April 3, "
Saw mill, dog lever	Martin Rich	Caroline, N. Y.	Mar. 25, "
Saw mill, gauge	William A. Needham	Brimfield, Mass.	Sep. 9, "
Saw mill, machinery and wheels	John Muir	Menallen, Pa.	Sep. 26, "
Saw mill, portable	David Russell	Tuscumbia, Ala.	Oct. 27, "
Saw mill, saw	Levi Fisk	Schroon, N. Y.	Aug. 17, "
Shingles, metallic, for roofs	Chade Southwick and Israel J. Richardson	Palmyra, N. Y.	April 8, "
Shingles, sawing	Daniel B. Moore	Strafford co., N. H.	Aug. 15, "
Shingles and staves, shaving	William W. Wilkinson	Wayne, Ohio	Sep. 26, "
Staves, cutting, from steam timber	George Pack	Sullivan, N. Y.	Oct. 10, "
Staves, dressing	Joseph Sweet	Boro' of Muncey, Pa.	Oct. 28, "
Staves and shingles, heading of barrels	John Everheart, Jacob Pearson, John Morford and Nathan Everheart	Wayne, Ohio	Oct. 6, "
Staves, saw	Harvey Holmes	N. Marlboro', Mass.	Jan. 21, "
Staves, saw	Hart Pepper	Southwick, Mass.	Feb. 5, "
Staves and shingles, shaving and heading	John Everheart	Waynesville, Ohio	June 12, "

CLASS XV.—STONE AND CLAY MANUFACTURES, *including Machines for Pottery, Glass making, Brick making, Dressing and Preparing Stone, Cements, and other Building Materials.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Brick machine	J. M. Bannister	Phelps, N. Y.	June 19, 1835
Brick machine	George W. Gilbert	Pittsburgh, Pa.	Aug. 15, "
Brick press	Nathan Sawyer	Mount Vernon, Ohio	April 8, "
Brick press	William Wadsworth	Hartford, Conn.	June 26, "
Brick press	Nathan Reed	Belfast, Me.	Aug. 20, "
Brick press and delivering	Ulysses Ward	Washington, D. C.	Dec. 15, "
Brick, shape of, for roofs	James Parker	Gardiner, Me.	Aug. 15, "
Brick, striker	Peleg Sweet	Ashtabula, Ohio	Feb. 20, "
Brick and tile	Benton P. Coston	Sterling, Pa.	Oct. 22, "
Brick, &c., and tile	Benjamin Hamblet	Portland, Me.	Dec. 28, "
Clay, potters, purifying	Adam Weber	Womelsdorf, Pa.	Sep. 9, "
Glass and stone, grinding, &c.	Peter Cooper	New York	Mar. 24, "
Mortar, machine, and mason's tender	Samuel Whitman	Danville, Ill.	Mar. 11, "
Mortar, mixing, &c.	Swimley and Everhart	Washington, D. C.	June 20, "
Mortar, mixing, and hoisting brick	Jesse Rinehart	Danville, Ill.	June 6, "
Stone, sawing	Joseph F. Duller	Philadelphia, Pa.	May 22, "
Stone, saw-mill	Daniel Bunnel	Xenia, Ohio	Oct. 27, "

CLASS XVI.—LEATHER, *including Tanning and Dressing, Manufacture of Boots, Shoes, Saddlery, Harness, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Boarding machine, for softening hides	Eli Kendall	Ashby, Mass.	June 19, 1835
Boots, bootees, &c., cutting the uppers	Joseph T. Buck	New Canaan, Conn.	Oct. 27, "
Boots, machine for blacking and cleaning	John Folsom	Hallowell, Me.	Ap'l 14, "
Boots, machine for turning boot legs	S. C. Blodget and Henry Boynton	Rowley, Mass.	Sep. 26, "
Boots, manufacturing by the hinge or boot cramp	Nathan Ayer	St. Johnsbury, Vt.	June 19, "
Boots and shoes, water proof	David Clarkson	New York	Dec. 2, "
Currier's knife and double trimmer	Luther Townsend	Farmington, Me.	Jan. 16, "
Finishing leather	Cushman Bassett	Boston, Mass.	Mar. 25, "
Harness, collars, blocking and stretching	Melvin Eddy	Adams, N. Y.	Ap'l 22, "
Harness, hames, fastening, horse	Timothy Taylor	Loudoun co., Va.	Mar. 11, "
Harness, hames, wood, supersede collars	Sereno Norton	E. Bloomfield, N. Y.	June 12, "
Harness, horse collars	Caleb Angevine	New York	Oct. 27, "
Harness, horse collars	Henry C. Call	Sterling, Conn.	Nov. 14, "
Harness, horse collars, cutting tops of	Timothy Deming	East Hartford, Conn.	Mar. 6, "
Saddles, riding, of gum elastic webbing	A. L. Vanhorn	Philadelphia, Pa.	June 26, "
Saddles, seat, spring	Marshall Bayliss and W. Brannon	Fredericksburg, Va.	May 16, "
Saddles, spring	Joel Woodward	Marshalltown, Pa.	Oct. 6, "
Saddles, spring	Adam Hickman	Abingdon, Va.	Nov. 23, "
Saddles, spring	Charles Bates	Staunton, Va.	Nov. 26, "
Saddles, spring seat, riding	J. G. Palmer, Harvey, and Anthony Beard	Greenville, Va.	June 12, "
Saddles, trees, ladies	John M. Bouton	Newark, N. J.	Aug. 17, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Shoes, water proof	Ernst G. Augustin	New York	July 6, 1835
Splitting leather and paring	Herrick Aiken	Middlesex, Mass.	June 12, "
Tanning hides	Jno. Lippincott and Jno. Hillyear	Philadelphia, Pa.	Ap'l 14, "
Tanning, improvement in	Isaac M. Belote	Fayette co., Tenn.	Ap'l 14, "
Tanning, preparing extract of bark for	Otis Batchelder	Bedford, N. H.	Nov. 7, "
Tanning, preparing skins	J. C. F. Salomon	Reading, Pa.	Oct. 17, "
Tan-vats, reservoirs, constructing with cement	John C. Johnson	Catskill, N. Y.	Feb. 20, "
Trunks and settee	Benjamin Morris	New Richmond, O.	Jan. 16, "

CLASS XVII.—HOUSEHOLD FURNITURE, *Machines and Implements for Domestic Purposes, including Washing Machines, Bread and Cracker Machines, Feather Dressing, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Beds, palm leaf	Josiah C. Smith	Cambridgeport, N.Y.	Apr. 3, 1835
Beds, spring, spiral conical	W. J. and A. E. Lyman	East Hampton, Mass.	Sept. 18, "
Bedsteads	B. F. Berry	Utica, N. Y.	Apr. 22, "
Bedsteads	Perry Prettyman	Georgetown, Del.	Sept. 26, "
Bedstead machine	Aaron Stedman	Pittsford, N. Y.	Jan. 16, "
Bedstead and mattress	Edmund Cherington	Boston, Mass.	Nov. 23, "
Bedstead, for the sick	Nathaniel Richardson	Boston, Mass.	Sept. 9, "
Brush, art of making	William Steele	New York	Aug. 17, "
Chairs	Eli F. Benjamin	Utica, N. Y.	Aug. 17, "
Cheese, machine for turning and curing	Henry Webber	East Richfield, N. Y.	Apr. 22, "
Crackers, cutting	Thomas and Thomas H. Havener	Washington, D. C.	Oct. 17, "
Crackers, cutting	W. R. Nevins	New York	Oct. 17, "
Crackers, cutting	Levin P. Clark	Baltimore, Md.	Nov. 7, "
Cutting meat	John Morris	Derby, Conn.	Feb. 25, "
Cutting sausage meat	Peter Fahnestock and J. Monn, Jr.	Quincy, Pa	Mar. 11, "
Cutting sausage meat	A. and J. Keagy	Morrison Cove, Pa.	June 15, "
Cutting sausage meat	James Burns and Jno. Walter	Waynesborough, Pa.	Jan. 16, "
Cutting vegetables	Jonathan Clark	Hampton, Conn.	July 7, "
Feathers, dressing and cleaning	Orestes Badger	Otsego, N. Y.	Apr. 22, "
Feathers, cleaning and purifying	George Reynolds	East Hartford, Conn.	Sept. 11, "
Feathers, dressing and purifying	Bartholomew Smith	Schodiack, N. Y.	Nov. 23, "
Grater	E. B. Strong	Buffalo, N. Y.	Aug. 27, "
Ironing clothes	Samuel Swett, Jr.	Readfield, Me.	Dec. 30, "
Refrigerator	John Waring	Port Tabago, Va.	June 12, "
Sofa, chairs, &c., springs for	Edward Cherrington	Boston, Mass.	Nov. 23, "
Washing machine	Stillman Roberts	Portland, Me.	Jan. 16, "
Washing machine	Amos C. Haniford	Northfield, N. H.	Feb. 6, "
Washing machine	Stephen A. McGeorge	Alexander, N. Y.	Mar. 24, "
Washing machine	Ezra Whitman, Jr., (assignee of Ezra Whitman)	Winthrop, Me.	Mar. 27, "
Washing machine	John Snyder, Jr.	New York	May 2, "
Washing machine	Philo Hunt	Litchfield, Conn.	May 2, "
Washing machine	Jacob Sager	Harrisonburg, Va.	May 9, "
Washing machine	John T. Denniston	Alexander, N. Y.	May 22, "
Washing machine	A. W. Soull	Portland, Me.	July 18, "
Washing machine	David Warren	Winthrop, Me.	Aug. 27, "
Washing machine	Wm. and J. D. Collins	Norwich, Conn.	Aug. 27, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Washing machine	James Lombard	Readfield, Me.	Sept. 9, 1835
Washing machine	J. J. and E. C. Milliken	Winthrop, Me.	Sept. 26, "
Washing machine	John O. Geer	Norwich, Conn.	Oct. 10, "
Washing machine	Henry Ault	Philadelphia, Pa.	Oct. 14, "
Washing machine	Isaac Spicer	Norwich, Conn.	Oct. 17, "
Washing machine and churn	Mitchell & Fairbanks	Readfield, Me.	May 9, "
Washing machine and fulling	Orin D. Wade	China, N. Y.	Sept. 9, "
Water closet, portable	James Stone	New York	Mar. 11, "
Window shades, &c., rolling up	Henry Lamson	Boston, Mass.	July 17, "

CLASS XVIII.—ARTS, POLITE, FINE AND ORNAMENTAL, *including Music, Painting, Sculpture, Engraving, Books, Paper, Printing, Binding, Jewellery, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bills of credit	John Golder	Philadelphia, Pa.	Sep. 26, 1835
Bills of exchange	Charles C. Wright	New York	June 19, "
Brushes, for blending colors, &c.	George M. Morris	Philadelphia, Pa.	Mar. 6, "
Cutting press, for paper	Benjamin Morris	Oxford, N. Y.	Feb. 15, "
Ink, distributer, self-operating	John Maxson	Schenectady, N. Y.	Jan. 9, "
Inking machine, for inking types	Sam'l Fairlamb and Jno. Gilpin	New York	Mar. 27, "
Pen, metallic	Pregrine Williamson	New York	Mar. 30, "
Pencil, everpointed lead	Elwood Meeds	Philadelphia, Pa.	June 26, "
Pencil points, making and composition	Guy C. Baldwin	Ticonderoga, N. Y.	Dec. 2, "
Piano, compensating tubes	Thomas Loud	Philadelphia, Pa.	July 7, "
Printing apparatus	Joseph Warren	Warwick t'p, Ohio.	May 2, "
Printing press	J. Lemuel Kingsley	New York	Ap'l 22, "
Printing press, register for Napier.	M. Caton and J. C. Rives	Washington, D. C.	Mar. 11, "
Ruling machine for paper	James C. Teasdale	Dansville, N. Y.	June 15, "
Stamps, for post and other offices.	Benjamin Chambers	Washington, D. C.	Sep. 9, "

CLASS XIX.—FIRE ARMS AND IMPLEMENTS OF WAR, AND PARTS THEREOF, *including the Manufacture of Shot and Gunpowder.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cartouch box	Robert Dingee	New York	Aug. 15, 1835
Fire arms, overlaying with tin, &c.	Samuel Ladd	Waltham, Mass.	Oct. 14, "
Lock, percussion, cannon	Robert Beale	Washington, D. C.	Jan. 13, "
Lock, percussion, gun	Robert Beale	Washington, D. C.	Feb. 20, "
Lock, percussion, gun	Thomas Daplyn	Dover, Ohio	Feb. 20, "
Pistols, pocket	Victor M. Wallace	West Topham, Vt.	Aug. 17, "

CLASS XX.—SURGICAL AND MEDICAL INSTRUMENTS, *including Trusses, Dental Instruments, Bathing Apparatus, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bath, vapor	P. P. N. D'Alvigny	Leonard st., N. Y.	Aug. 17, 1835
Bleeding horses, &c., instrument for	Cornelius Addle	Winthrop, Me.	May 9, "
Corns, eradicating, &c	William Davis	Williamsburg, Va.	Sep. 9, "
Nipple shield	William Baxton	Woburn, Mass.	Ap'l 2, "
Truss, common convex	Philip Hittel	Philadelphia, Pa.	May 2, "
Truss, gum elastic, hernia	Vernum Wilkinson	New York	Nov. 14, "
Truss, gum elastic, hernia	Robert Semple	Vidalia, La.	Nov. 14, "
Truss, for hernia	John W. Wood	Clark county, Ky.	Ap'l 2, "
Truss, for hernia	Benjamin M. Smith	Lumpkin co., Ga.	Ap'l 14, "
Truss, for hernia	John J. Heintzelman	Philadelphia, Pa.	June 6, "
Truss, relaxation of the vagina	John F. Cray (Administrator of A. G. Hull)	New York	Dec. 9, "
Truss, spring	Henry Reid	Augusta, Ga.	Oct. 31, "

CLASS XXI.—WEARING APPAREL, *Articles for the Toilet, &c., including Instruments for Manufacturing.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Brush, hair	Joseph B. Burgess	New York	Ap'l 14, 1835
Combs, for the hair	George Hooker	Bristol, Conn.	April 3, "
Combs, metallic	Nath'l. Bushnell	Middletown, Conn.	Oct. 31, "
Combs, teeth, cutting of	Lemuel Adams	Redding, Conn.	May 2, "
Garments, measuring for	John S. Rockafellow	Flemington, N. J.	Sep. 18, "
Garments, measuring and marking out coats	Allen Ward	Philadelphia, Pa.	Jan. 7, "
Garments, tailor's measure for laying out	Frederick A. Fairchild	Columbus, Ga.	Oct. 31, "
Razor, sharpening, application of adhesive slate	William Child	Baltimore, Md.	Dec. 15, "
Shears, tailor's	John Androws, assignee of Rochius Heenisch	New York	Mar. 11, "
Stock for the neck	Thomas Goodrum	New York	Aug. 27, "

CLASS XXII.—MISCELLANEOUS.

INVENTIONS OR DISCOVERIES	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Caoutchouc, cutting into shreds	William Atkinson	New York	Oct. 6, 1835
Coffins, of artificial stone or marble	John White	New York	July 18, "
Coffins, from hydraulic cement	Dayton, Hoyt and White	Salina, N. Y.	June 6, "
Coffins, from hydraulic cement	John White	New York	July 18, "
Scalding hogs by steam	Thomas J. Goodman	Baltimore, Md.	Feb. 13, "
Tobacco, manufacturing chewing, (called Roanoke leaf)	E. W. D. Chassaing	Baltimore, Md.	Mar. 24, "

[G.]

ALPHABETICAL LIST

OF PERSONS WHOSE PATENTS HAVE EXPIRED DURING THE YEAR 1849, WITH THEIR INVENTIONS OR DISCOVERIES AND CLASS.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Abbot, Andrew	Cooking stove	V.
Adams, Isaac	Hulling coffee berry	I.
Adams Seth	Windlass, ship's	XII.
Addle, Cornelius	Bleeding horses and instruments for	XX.
Adams, Lemuel	Combs, teeth, cutting of	XXI.
Aiken, Herrick	Saw set	II.
Aiken, Herrick	Splitting leather, &c	XVI.
Allen, Samuel S.	Thrashing machine	I.
Allsop, Geo. M.	Steam engine, rotary	VI.
Allen, Samuel S.	Horse power, portable	XIII.
Ames, John	Paper machine	III.
Angevine, Caleb	Churn	I.
Angevine, Caleb	Harness horse collars	XVI.
Andrews, Jno., assignee of Rochius Heinisch	Shears, tailors'	XXI.
Armstrong and King	Cooler, flour sifter, &c	XIII.
Arnold, William E.	Horse power	XIII.
Ashmore, D. and J. Peck	Cutting grain, &c	I.
Ashcroft, Thomas	Boilers, steam	VI.
Aspinwall, Lewis	Block sheaves, &c	VII.
Atkinson, William	Caoutchouc spreading, &c.	IV.
Atwater, James	Stove furnace	V.
Atkinson, Wm. and E. Hale	Raising vessels	VII.
Atkinson, William	Caoutchouc, cutting into shreads	XXII.
Augustin, Ernst G	Straw cutter	I.
Augustin, Ernst G	Cooking stove aud warming rooms	V.
Augustin, Ernst G	Saw mills	XIV.
Augustin, Ernst G	Shoes, water-proof	XVI.
Ault, Henry	Washing machine	XVII.
Ayer, Nathan	Boot manufacturing, &c.	XVI.
Bacon, Asahel	Churn, propelling by weights	I.
Badlum, Edward, Jr.	Cutting, cradle for grain	I.
Baker, Nathan	Plough	I.
Barnes, Eli, G. Hill and S. B. Hawkins	Brand	II.
Badger, L. V. and R. Walker	Forge hearth, &c.	II.
Badger, L. V.	Furnace, hot air and cupola	II.
Baldwin, Guy C.	Composition pencil points	IV.
Bailey, J. and W. C.	Boiler, kitchen	V.
Bacon, Ruben, and Elijah Harris	Fire place and chimney	V.
Baldwin, Jacob	Ovens, baking, &c	V.
Baldwin, M. W.	Steam engine, locomotive, &c., tubes for	VI.
Baldwin, M. W.	Steam engine, locomotive, &c., tubes for	VI.
Barnes, Orson	Steam engine, rotary	VI.
Baldwin, Ethan	Steam engine, rotary and boiler	VI.
Bates, Elisha	Steam power	VI.
Barbour, Philip E.	Propelling paddles for boats	VII.
Barron, James	Ventilating bellows for ships	VII.
Ball, Jonathan	Compass, mariners'	VIII.
Bachman, Heinrick	Car, railroad frame for	X.
Badlam, Edward, Jr.	Wheel, hubs, box setter, &c.	X.
Baker, John	Wheels for railroad cars	X.
Bachman, Heinrick	Pumps	XI.
Baker, Samuel T.	Press, cotton and hay	XII.
Baker, George and F. R.	Grist mill, and sawing, &c	XIII.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Bannister, J. M.	Brick machine	XV.
Basset, Cushman	Finishing leather	XVI.
Bayliss and Brannon	Saddles, seat, spring	XVI.
Bates, Charles	Saddles, spring	XVI.
Batchelder, Otis	Tanning, preparing extract of bark for	XVI.
Badger, Orestes	Feathers, dressing and cleansing	XVII.
Baldwin, Guy C.	Pencil points, making, &c.	XVIII.
Baxton, William	Nipple shield	XX.
Beam, Michael	Seeding, cotton planter	I.
Belden, Allen	Fur, substitute for, &c.	III.
Bernard, Robert S.	Composition, for medical purposes	IV.
Benedict, Philip	Stoves, stone coal	V.
Bennack, John	Steam engine	VI.
Belote, Isaac M	Tanning, improvement in	XVI.
Berry, B. F.	Bedsteads	XVII.
Benjamin, Eli F.	Chairs	XVII.
Beale, Robert	Locks, percussion cannon	XIX.
Beale, Robert	Locks, percussion gun	XIX.
Bigelow and Brigham	Awls, drills, &c., setting	II.
Bingham, Albert	Latch, &c., for doors	II.
Bliss, Zenas	Cloth dressing, &c.	III.
Blynn, Henry	Hats, bodies, stiffening	III.
Blanvelt, John C.	Stone eradicator	IX.
Bliss, Alexander	Balance platform	XII.
Blodget and Boynton	Boots, machine for turning, &c	XVI.
Bosworth, Nathaniel	Gold, extracting, from ore, &c	II.
Boden, Frederick N	Vinegar, mode of making	IV.
Bourne, Roswell	Railroad curves, construction of	IX.
Bonnycastle, Charles	Roofs, covering with tin, &c	IX.
Bouis, John	Roofs, covering with tin, &c	IX.
Bouton, John M.	Saddles, trees, ladies	XVI.
Brewster, Iram	Churn	I.
Bradley, Russel	Churn	I.
Brewster, Frederick	Plough, polyshare	I.
Briggs, Noah	Rake, horse	I.
Bradley, Russel	Thrashing machine, &c	I.
Brown, Truman B.	Winnowing machine	I.
Brown, Edward	Locking number of drawers	II.
Brundred, Benjamin	Blower, spiral cone	V.
Brown and Barker	Wheels, felloes, cutting machine	X.
Bradley and Worthley	Wheels, felloes, cutting machine	X.
Brandon, John	Horse power, portable	XIII.
Bradley, Grove	Mortising machine	XIV.
Brooks, Artemas L.	Planing machine	XIV.
Burrall, Thomas D.	Seeding, corn planter	I.
Burrall, Thomas D.	Thrashing machine	I.
Burgess and Baldwin	Thrashing machine, clover, &c.	I.
Burden, Henry	Shoes, horse	II.
Burr, Oliver C.	Loom	III.
Burch, John	Cooking, applying the, &c	V.
Burrall, Thomas D	Cooking stove	V.
Burch, John	Cooking stove, reflection of, &c	V.
Bulkley, M. Brook	Furnaces for anthracite	V.
Buffum, Arnold	Steam engine, rotary	VI.
Burgess, Phineas	Roofs, covering with tin, &c.	IX.
Burgess, Tristam and Simon	Hoops, truss making	XIV.
Bunnell, Daniel	Stone saw-mill	XV.
Buck, Joseph T	Boots, &c., cutting the uppers	XVI.
Burnes and Walter	Cutting sausage meat	XVII.
Burgess, Joseph B	Brush, hair	XXI.
Bushnell, Nathaniel	Combs, metallic	XXI.
Card, John	Smut machine	I.
Carman, Luther	Thrashing machine	I.
Campbell, J. R. and H. C.	Lock, door, and other fastenings	II.
Caldwell, Andrew	Spinning, hemp and flax	III.
Calvert, William W	Wool or flax, to brush into teeth	III.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Cameron, George	Steam engine, rotary, &c.	VI.
Campbell, John R	Diving dress	VII.
Campbell and Withington	Dock, floating, dry	IX
Catlin, Hebard and Abell	Cooler, flour	XIII.
Call, Henry C.	Harness, horse collars	XVI.
Caton & Rives	Printing press, register, &c.	XVIII.
Chandler, John P.	Cutting grass	I.
Chubbuck, Stephen	Nails, machine, nippers for Reed's	II.
Chichester, A. and S.	Hat blocks	III.
Chamberlain, Dexter H	Harpoon	VII.
Chapman, Samuel	Carriages, wheeled, &c.	X.
Cherrington, Edmund	Bedstead and mattrass	XVII.
Cherrington, Edward	Sofa, and springs for	XVII.
Chambers, Benjamin	Stamps, for post and other offices	XVIII.
Child, William	Razor, sharpening, &c	XXI.
Chassaing, Edward	Tobacco, manufacturing, &c	XXII.
Clark, Samuel	Churn	I.
Cline, Samuel	Plough	I.
Clinton, Charles	Cement for blocks, &c.	IV.
Clark, George R	Explosion, steamboats, &c.	VI.
Cleveland, George W	Railroad, running gear for	IX.
Clarkson, David	Boots and shoes, water proof	XVI.
Clark, Levin P.	Crackers, cutting	XVII.
Clark, Jonathan	Cutting vegetables	XVII.
Colton, Francis	Churn	I.
Cope, John W	Straw cutter	I.
Codman, John	Door, wire springs for	II.
Conklin, John C.	Forges and bellows for blacksmiths, &c.	II.
Cooley, Wm. S.	Gin cotton, boxing for	III.
Couillard, Samuel, Jr.	Wool, combing	III.
Cooper, Edward C.	Salts, manufacturing, &c.	IV.
Conway, Charles C.	Steam engine, centrifugal, &c.	VI.
Cooper, George Duncan	Gum elastic, applying to vessels	VII.
Cockran, Ebenezer	Water wheel, undershot	XI.
Coleman, Claverius	Gearing mills	XIII.
Cope, Pierson	Grist mill, &c	XIII.
Coston, Benton P.	Brick and tile	XV.
Cooper, Peter	Glass and stone grinding	XV.
Collins, Wm. and J. D.	Washing machine	XVII.
Cradit, David M	Laths, cutting	XIV.
Crook, Thomas	Kiln for drying grain	V.
Crosby, N. and P.	Saw mill, constructing	XIV.
Curtis, Joseph	Gold, amalgam, mill for, &c	II.
Curtis, Joseph	Gold, amalgam, mill for, &c	II.
Curtis, Joseph	Gold, amalgam, mill for, &c	II.
Currier, Nathan	Excavating and removing earth	IX.
Custer & Ponepacker	Horse power	XIII.
Curtis, Philo C.	Power, propelling by cams, &c	XIII.
Davis, David	Cultivator	I.
Davenport, Moses	Thrashing machine, &c.	I.
Daniels, Reuben	Napping cloth	III.
Davis, Henry G.	Spinning spindle, dead	III.
Dabol, Ezekiel	Cooking stove	V.
Davidson, Oliver	Doors, &c., and closing	IX.
Davenport, Charles	Car, railroad, &c	X.
Davis, Amos	Springs, carriages, &c.	X.
Darling, A. and B.	Water wheel	XI.
Dahl, Christopher F.	Balance steel-yards	XII.
Davenport, Moses	Horse power	XIII.
Dayton & Stedman	Lathe, &c.	XIV.
Darby, Joseph H	Mortising and tenoning	XIV.
Daplyn, Thomas	Lock, percussion	XIX.
Davis, William	Corns, eradicating, &c	XX.
Dayton, Hoyt & White	Coffins from cement	XXII.
D'Alvigny, P. P. N	Bath, vapor	XX.
Deakyne, John	Straw cutter	I.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Denson, William	Straw cutting and corn sheller	I.
Deming, Timothy	Harness, horse collars, &c	XVI.
Denniston, John T.	Washing machine	XVII.
Dick, Jesse S.	Thrashing, hulling and shelling, &c	I.
Dickinson, Solomon	Cooking stove	V.
Dinge, Robert	Cartouch box	XIX.
Ditson, Thomas	Hulling coffee-berry	I.
Douglass, Joshua	Cooking stove and fire-place	V.
Donn, John	Boats, fishing	VII.
Dodge, Nehemiah	Propelling wheels, &c	VII.
Douglass, William	Pump, forcing double	XI.
Dunbar & Powers	Corn sheller	I.
Duncan, William	Dyeing and printing woollen cloths	IV.
Duncan, Charles	Sugar moulds for loaf	IV.
Duller, Joseph L.	Stone sawing	XV.
Eastwick, Andrew M.	Valve, sliding	VI.
Eames, James	Theodolite, or compass	VIII.
Earle, Thomas	Roads, constructing	IX.
Eastman, Robert	Water wheel	XI.
Edgar, H. and J. W.	Thrashing machine, portable	I.
Edwards, Luke M.	Power propelling machinery, called lever and dead weights	XIII.
Eddy, Melvin	Harness collars, blocking and stretching	XVI.
Ellis, William	Washing potatoes and roots	I.
Elgar, John	Steamboat for canals	VII.
Elgar, John	Canals, transportation on, and rail roads	IX.
Eliason, Eleazer, Jr.	Press, cotton and hay, &c	XII.
Emmons, Uri	Saw mills	XIV.
Evans, David	Railroad, preventing, turning	IX.
Everhart, J., J. Pearson, J. Morford, and N. Everhart	Staves and shingles, heading of barrels	XIV.
Everhart, John	Staves and shingles, shaving and heading	XIV.
Fales, James	Cordage, rope serving	III.
Farnham, Calvin H.	Bleaching cloth and cleaning	IV.
Fairbanks, Thaddeus	Cooking stove	V.
Fairman, Legrand	Cooking stove	V.
Fahnestock & Monn	Cutting sausage meat	XVII.
Fairlamb & Gilpin	Inking machine, &c	XVIII.
Fairchild, F. A.	Garments, tailors' measure, &c	XXI.
Ferris, Peter	White and whiting, Paris	IV.
Fernald, Henry B.	Tide power	XI.
Fitzpatrick, Edward P.	Smut machine	I.
Fitzpatrick, Edward P.	Winnowing machine	I.
Field, William	Spinning speeder, double	III.
Fitzpatrick, Edward P.	Propelling boats, screw for	VII.
Fisk & Green	Wheel hubs and rotary bearings, anti-friction boxes	X.
Field, Aaron	Saw, use of	XIV.
Fisk, Levi	Saw mill saw	XIV.
Fossard, Felix	Dyeing with alkaline prussiates	IV.
Fox, Jesse	Boilers, steam, regulating height of water in	VI.
Folsom, John	Boots, machine for blacking and cleaning	XVI.
Fulton, James	Escapement for clocks	VIII.
Furbish, Webber	Horse power, endless chain	XIII.
Gatling, Gordon	Cotton thinner	I.
Gatling, Gordon	Seeding, cotton planter	I.
Gavit, William G.	Loom, power	III.
Gay, Gamaliel	Loom, power, for silk	III.
Gay, Gamaliel	Silk, unwinding	III.
Garfield, Lyman	Composition, water-proof, for roofs	IV.
Gates, Wm.	Japan, applied to leather	IV.
Gates, Benjamin	Steam power and boiler	VI.
Gates, Henry	Engine, fire pump for	XI.
Gates, George D.	Bungs, cutting	XIV.
Gates, Charles	Mortising machine	XIV.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Gay, Ira	Mortising and tenoning sash doors and blinds	XIV.
Gay, Ira	Planing window sash	XIV.
Gearheart, John	Thrashing grain, &c	I.
Gerrish, Ansel	Fire place and chimney funneled	V.
Gerrish, Wm.	Wheels, spokes, cutting tenons in	X.
Geer, John O.	Washing machine	XVII.
Ghormley, David	Plough	I.
Gilbert, Ezra B.	Charcoal burner, conical arch	V.
Gill, Bennington	Cooking stove	V.
Gilpin, Thomas	Press screw	XII.
Gilbert, Geo. W.	Brick machine	XV.
Goodman, Robert T.	Seeding, cotton planter	I.
Gould, Samuel	Thrashing and hulling grass seed	I.
Goulding and Bracket	Cloth, winding up	III.
Goulding, John	Cordage, rope laying	III.
Goulding, John	Flax and hemp, preparing, &c	III.
Goulding, John	Flax and hemp, and tow hatcheling	III.
Goodell and Harvey	Loom power, weaving stock frames	III.
Goodyear, Charles	Cement, gum elastic	IV.
Gore, Ezekiel, Jr.	Cooking stove	V.
Goulding, John	Boilers, steam pipes, &c	VI.
Gordon, Henry	Stumps, extracting	IX.
Gordon, Henry	Saw-mill carriage	XIV.
Goodyear, Charles	Pumps, air	XI.
Golder, John	Bills of credit	XVIII.
Goodrum, Thomas	Stock for neck	XXI.
Goodman, Thomas J.	Scalding hogs by steam	XXII.
Groves, Wm.	Bee house	I.
Gray, Robert	Corn sheller and cleaner	I.
Gray, Guy	Plough, breaking and cultivating, &c	I.
Gray, Wm. Waller	Ointment, cure of diseases	IV.
Greeley, Ebenezer S.	Fire-place	V.
Griffing, Nereston	Balance	XII.
Greenville, Alonzo S.	Pressing and raising weights, &c	XII.
Gray, J. F., administrator of A. G. Hull	Truss, rupture	XX.
Harris, Jas. S.	Corn sheller	I.
Harmony, John	Granaries, wheat, &c	I.
Hatch, Julius	Lime, &c., spreading	I.
Hatch, Julius	Lime, &c., sowing	I.
Hall, Ashman	Straw cutting	I.
Hale, Luke	Thrashing machine	I.
Hamilton, James	Trees, &c., mode of felling	I.
Harley, James	Castings, chilled cylinders and cones	II.
Hathaway, Nathan	Composition to prevent absorption of animal and fish oils	IV.
Harrington, Daniel	Galvanic electricity, applied to the surface of the human body	IV.
Harrington, Daniel	Galvanic electricity, to cure diseases	IV.
Hartstuff and French	Potash, manufacturing	IV.
Haws, Jonathan	Dock, floating, dry	IX.
Hale, Aaron	Axletrees and wheels	X.
Hale, Aaron	Wheels and axles	X.
Hall, Isaac	Pump, rotary	XI.
Hauser, Philip	Grist mill	XIII.
Haven, James	Lathe, turning rake handles	XIV.
Hamilton, James	Saw for felling trees	XIV.
Hamblet, Benjamin	Brick, &c. and tile	XV.
Havener, T. and T. H.	Crackers, cutting	XVII.
Haniford, Amos C.	Washing machine	XVII.
Herrick, Wm. A.	Churn	I.
Hess, William	Plough	I.
Heberling, Henry	Thrashing machine	I.
Herron, James	Car, railroad and wagon, &c	X.
Herman, James	Grooving plane	XIV.
Hedge, Lemuel	Rules, carpenters' joints	XIV.
Heintzleman, John J.	Truss for hernia	XX.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Hinkson, Lewis	Churn, spiral spring	I.
Hinman, Isaac	Hoes, manufacturing	II.
Hinman, Isaac	Rolling metals	II.
Hill, Charles	Steam engine, rotary re-acting	VI.
Hinkley, Benjamin	Axletrees, diminishing friction	X.
Hibbard, Elias	Balance for counters, &c.	XII.
Hibbard, E. A. and A.	Balance, platform, double lever scale	XII.
Hinman, John	Packing flour	XII.
Hinman, Jesse	Spindle, oil bush	XIII.
Hickman, Adam	Saddles, spring	XVI.
Hittel, Philip	Truss, common convex	XX.
Holt, William	Ploughshare, coulter and mould board	I.
Hoth, Hiram	Winnowing cloverseed	I.
Hotchkiss, J. G.	Locks, mortise and latch	II.
Howard, John C.	Fire place, cooking and baking	V.
Holbrook, George	Spark catcher	VI.
Hotchkiss, J. G.	Steam engine, rotary, re-acting	VI.
Holton, Elisha	Gristmill, constructing	XIII.
Hoover, Isaac	Lathe, coopers'	XIV.
Holmes, Harvey	Staves, saw	XIV.
Hooker, George	Combs for the hair	XXI.
Hurst, Abraham	Smut machine, and garlic	I.
Hubbell, Jonathan S.	Coal anthracite, cracking	V.
Hubbard, Harvey	Stoves, furnace	V.
Hunsicker and Krauss	Boilers, steam feeding	VI.
Hunt, David W.	Raising water to set machinery in motion	XI.
Hunt, Philo	Washing machine	XVII.
Hyde, Samuel	Grist mill	XIII.
Igget, John	Cooking stove, portable	V.
Ingalls, Elkanah	Grates and stoves, parlor and kitchen	V.
Ingalls, Elkanah	Stoves and grates	V.
Jackson, Potter and Miller	Spinning spindle, rotary and stationary	III.
Janeway, Jacob J.	Stoves, anthracite coal	V.
James, W. T.	Railroad, self-adjusting	IX.
Jennings, Josiah	Distilling spirits turpentine	IV.
Johnson, Benjamin	Plough, cary bull	I.
Jordan, John W.	Plough, hill side, inverting, &c.	I.
Jones, Henry C.	Straw, cutting cabbage, &c.	I.
Johnson, William G.	Thrashing machine	I.
Johnson, Henry	Thrashing machine	I.
Jones, James	Spinning, roping & doubling cotton, silk, &c.	III.
Jordan, Andrew P. H.	Corn grinding and crushing	XIII.
Johnson, William S.	Grist mill and paints, snuff, &c.	XIII.
Jones, Irby	Horse power	XIII.
Jones, William	Auger	XIV.
Jones, William	Auger	XIV.
Johnson, John C.	Tan vats, reservoirs, constructing with cement	XVI.
Jones, Alfred C.	Spark catcher	VI.
Johnson, Elisha	Railroad	IX.
Kellog, Sirah	Hulling cotton seed and rice	I.
Kent, Edward N.	Cooking stove	V.
Kendall, Eli	Boarding machine for softening hides	XVI.
Keagy, A. and I.	Cutting sausage meat	XVII.
Kile, Conrad	Loom, weaving stocks	III.
Kimball and White	Mead composition	IV.
Kirkpatrick, John	Valve for boilers	VI.
Kirkpatrick, John	Valve engines	VI.
Kidder, Levi	Cistern reservoirs, vats, &c.	XI.
Kimball, Perry and Spalding	Hoops and barrels, dressing	XIV.
Kingsley, J. Lemuel	Printing press	XVIII.
Knight, Michael	Churn	I.
Knickerbacer, James	Forges, backs, blacksmiths'	II.
Laighton, William	Thrashing machine	I.
Lampson, Curtis M.	Fur cutting machine	III.
Ladd, S. G., assignee of Seth Graham	Fur, extracting hair from	III.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Lane, Charles	Fire-place and grate	V.
Law, George	Bridges	IX.
Lampman, Nicholas J.	Auger, boring large holes	XIV.
Langdon, Barnabas	Laths, splitting and cutting	XIV.
Lampson, Henry	Window shades, rolling up	XVII.
Ladd, Samuel	Fire arms, overlaying with tin	XIX.
Lee, James A., adm'r of James Lee	Weevil, mode of destroying	I.
Lewis, John	Stoves, heating irons, tailors and hatters	V.
Le Roy, Tunis V.	Heat, economy of, &c.	VI.
Lester, Eben A.	Coaches, panels	X.
Ling, Thomas	Churn and washing machine	I.
Lippincott and Hillyear	Tanning hides	XVI.
Lowell, Philip S.	Churn	I.
L'Hommedieu, Ezra	Auger or bit	XIV.
Lombard, James	Washing machine	XVII.
Loud, Thomas	Piano forte, compensating tubes	XVIII.
Lyman, W. J. and A. E.	Beds, spring, spiral, conical	XVII.
Mack, Orlando	Bee hive	I.
Mathews, Wm	Thrashing machine for rice, &c.	I.
Mayo, Robert	Fire draught, &c.	V.
Marden, Jesse	Balance platform	XII.
Macomber, E. and L. L.	Press cotton, &c.	XII.
Martin, James	Corn grinding, &c.	XIII.
Manning, Cephas	Grist mill, &c.	XIII.
Marston, Obed R.	Power propelling mills	XIII
Maxton, John	Ink distributor, &c.	XVIII
McMath, James	Straw cutter, &c.	I.
McCoy, David G.	Thrashing machine	I
McNary, Isaac	Cooking stove	V.
McGrew, Alexander	Air condensed, for propelling, &c.	XI.
McCord, John B.	Water wheel	XI.
McBride, John	Mortising machine	XIV.
McLaughlin and Hill	Planing machine	XIV.
McGeorge, Stephen A.	Washing machine	XVII.
Mervin, Andrew T.	Saw teeth, cutting	II.
Merrick, Solyman	Wrench, screw	II.
Merril, William	Water wheel	XI.
Merril, Elias T.	Lever, crank and combination of	XII.
Meeds, Elwood	Pencil, everpointed, lead	XVIII.
Merriman, Marcus, Jr.	Window sash, bolt, and spring	II.
Miller and Lawes	Hulling cotton seed	I.
Miller, Samuel R.	Compass, surveying, &c.	VIII.
Mills and Furnald	Hydrostatic, &c., machine for propelling	XI.
Miner, Amos	Pumps	XI.
Mix, Phelps	Pumps	XI.
Mitchell, Thomas	Horse power	XIII.
Milliken, J. J. and E. C.	Washing machine	XVII.
Mitchell and Fairbanks	Washing machine	XVII.
Morril, Samuel	Bee hive	I.
Morse, Elijah	Corn sheller	I.
Mott, Jordan L.	Bars for grates, &c.	II.
Morris, John D.	Castings, moulds for iron pipes, &c.	II.
Mosely, Lucilius H.	Silk, throwing or twisting	III.
Morey, Willard	Candle wick, &c.	IV.
Morgan, Jonathan	Glue manufacturing	IV.
Moffat and Taintor	Cooking stove, self-heat retaining	V.
Mott, Jordan L.	Stoves	V.
Mott, Jordan L.	Stoves, knobs or handles	V.
Morse, Andrew, Jr.	Clocks, &c., propelling	VIII.
Morse and Putnam	Coffee mill, &c.	XIII.
Moses, Owen	Grist mill	XIII.
Moore, Daniel B.	Shingles, sawing	XIV.
Morris, Benjamin	Trunks, &c.	XVI.
Morris, John	Cutting meat	XVII.
Morris, Geo. M.	Brushes for blending colors, &c.	XVIII.
Morris, Benjamin	Cutting press for paper	XVIII.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Murphree, Nimrod	Straw cutter	I.
Murphy, John	Steam engine	VI.
Mulford, Jonathan	Bending masts, &c.	VII.
Mulford, Jonathan	Masts, &c., bending	VII.
Munger, Asahel	Level, pendulum	VIII.
Murray, Alexander J.	Press, cotton, &c.	XII.
Muir, John	Saw mill machinery, &c.	XIV.
Myers, John D.	Ink	IV.
Napier, David P.	Mill stones, dressing	XIII.
Newton, Orrin	Knobs, screw for glass	II.
Newton, Elias W.	Grates, &c.	V.
Newton, Elias W.	Stoves, manufacturing	V.
Newman, Edward	Water wheel, tub	XI.
Needham, Wm. A.	Saw mill guage	XIV
Nichols, Jeremiah	Winnowing machine	I.
Nicolet, Julien	Anti-friction wheels	VII
Nevins, W. R.	Crackers, cutting, &c.	XVII
Norris, Elisha O.	Fulling mill, &c.	III
Norcross, Leonard	Spinning	III.
Nott, Eliphalet	Cooking stove, &c.	V.
Nott, Eliphalet	Cooking stove, &c.	V.
Nott, Eliphalet	Furnaces, adjustment of, &c.	V.
Nott, Eliphalet	Kitchen ranges	V.
Nott, Eliphalet	Boilers, steam, &c.	VI.
Norcross, Leonard	Stumps, &c., extracting	IX
Norcross, Adna L.	Grist mill	XIII.
Norton, Sereno	Harness hames, &c.	XVI
Nuckols, H. P. and P.	Grist mill	XIII
Oaks, Calvin	Capstands for ships	VII
Oehler, Andrew	Power, &c., engine	XIII.
O'Conner, James	Boats, canal, transhipment of merchandise	VII.
Odiorne, Thomas	Boilers, steam regulating, height of water in	VI.
Odiorne, Thomas	Engine, fire	XI.
Odiorne, Thomas	Pump for ships	XI.
Olcott, Charles	Constructing ships	VII.
Osgood, Lucien	Whipper cotton, oblique	III.
Otis, Charles	Churn, &c.	I.
Owings, John	Furnace, smelting, &c.	II.
Park, Ira	Churn, &c.	I.
Pagett, Washington F.	Thrashing machine	I.
Parkhurst, Stephen H.	Doffer	III.
Parkhurst, Stephen R.	Tenter bars	III.
Parker, Clowes and Garfield	Cement, hydraulic	IV.
Parker, Obadiah	Cement, hydraulic	IV.
Parker, Silvester	Cooking stove, &c.	V.
Payne, George J.	Stoves	V.
Parry, John C.	Stoves, covering the rods, &c.	V.
Parmelee, Luman	Boats, canal, sheet iron, twin	VII.
Pardee, William	Clocks, &c.	VIII.
Palisse and Durfee	Chain, &c., used on canals, &c.	IX.
Pace, Henry, Sen.	Springs, carriages	X.
Palmer, Alfred	Cistern water, &c.	XI.
Payne, Jonathan	Press, lever	XII.
Page, Jonathan	Mortising machine	XIV.
Page, George	Mortising chisel	XIV.
Pack, George	Staves, cutting, &c.	XIV.
Parker, James	Brick, shape of, &c.	XV.
Palmer, J. G. H. and A. Beard	Saddles, spring seat	XVI.
Perin, Moses	Chimneys, &c.	V.
Peckham, Charles W.	Stoves, heating apartments	V.
Peters and Dean	Pump, rotary	XI.
Percival, Orvill	Auger, &c.	XIV.
Pepper, Hart	Staves, saw	XIV.
Phelps, Hiram	Churn	I.
Phelps, Hiram G.	Cooking stove, baking	V.
Phelps, David	Press, cheese	XII.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Phelps, Samuel	Saw mill, carriage	XIV.
Pike, Barnabas	Grates	V.
Pierce, Thomas	Water wheel, inclined	XI.
Plantou, Anthony	Boats, canal and rivers	VII.
Porter, Alexander	Thrashing, &c., grain	I.
Porter, Henry	Composition, supplying lamps	IV.
Pollard, Samuel	Ovens, construction, &c.	V.
Porter, Rufus	Dock, floating, dry	IX.
Powell, Isaac	Water wheel	XI.
Porter, Rufus	Press, cheese, self-adjusting	XII.
Pratt, Elisha	Hats, &c.	III.
Preswick and Fisher	Oil of hazze, preparation of	IV.
Pryor, Philip	Cider mill, cast iron	XIII.
Prettyman, Perry	Bedsteads	XVII.
Rake, horse	James Pudney	I.
Putnam, Joseph	Slabs for fire brick, &c.	V.
Randall, Benjamin	Churn	I.
Rand and Norcross	Corn sheller	I.
Rathbone, Joel	Cooking stove, flat	V.
Raub, Samuel, Jr.	Gauge, steam, for preventing, &c	VI.
Reynolds, Samuel G.	Nails, wrought	II.
Redheffer, James	Tin ware, seaming	II.
Redfield, Heman	Trip hammer	II.
Resor, Wade and Resor	Cooking stove	V.
Reynolds, Edward	Wheels, felloes, bending	X.
Redelsperger, Joseph	Pumps	XI.
Reynolds, Samuel G.	Mill, metallic file, &c.	XIII.
Read, Nathan	Brick press	XV.
Reynolds, George	Feathers, dressing and cleaning	XVII.
Reid, Henry	Truss, spring	XX.
Reinhart, Charles	Mortising chisel	XIV.
Ridings, John P.	Thrashing machine, clover	I.
Richards, Gilbert	Fire place, sheet iron	V.
Richardson and Fuller	Carriages, measuring distance	X.
Richmond, David	Coffee mill, and pepper, &c.	XIII.
Richardson, Israel J.	Mortising machine	XIV.
Rich, Martin	Saw mill, dog guage	XIV.
Rich, Martin	Saw mill, dog lever	XIV.
Rinehart, Jesse	Mortar mixing and hoisting brick	XV.
Richardson, Nathaniel	Bedstead for the sick	XVII.
Ross, Joseph	Hulling cloverseed and cleaning	I.
Robinson, Nathan	Plough	I.
Ross, Joseph	Thrashing machine	I.
Ross, Wm. W.	Thrashing machine	I.
Roberts and Carson	Cement for cisterns	IV.
Rogers, Robert	Warming buildings, &c.	V.
Rohey, Joseph, Jr	Roads, constructing, &c.	IX.
Rohr, J. G., assignee of Baptiste Maag	Balance, weighing machine	XII.
Roberts, Stillman	Washing machine	XVII.
Rockafellow, John S.	Garments, measuring for	XXI.
Rundell, Abraham	Cutting grain, and rake	I.
Rucker, T. Jr., assignee of P. Cheek	Thrashing machine	I.
Russell, Charles E.	Furnace and bake oven	V.
Rust, Samuel	Lamps, wicks, raising and lowering	V.
Russell, David	Power propelling machinery	XIII.
Ruthven, John	Saw cutting timber	XIV.
Russell, David	Saw mill, portable	XIV.
Ryerson, Reading	Churn, cutting floats of	I.
Sands and Kendig	Smut machine	I.
Sanders, Wm. H.	Castings, metallic pin, &c	II.
Sawyer, Isaac	Forges, backs, blacksmiths	II.
Sampson, Elanthan	Cooking stove	V.
Salmon, J. F. C.	Boilers, steam	VI.
Sawyer, Nathan	Brick press	XV.
Salomon, J. C. F.	Tanning, preparing skins	XVI.
Sager, Jacob	Washing machine	XVII.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Scarbrough, Wm	Hulling rice, polishing	I.
Scott, John	Fire proof chests	II.
Scott, John	Asbestos, use and application of, &c	V.
Scarbrough, Wm	Steam, generating	VI.
Scarbrough, Wm	Propelling steamboats and other vessels	VII.
Seymour, Bradford	Castings, smoothing the oxide and sand on.	II.
Seymour and Whipple	Fire alarm	V.
Sellers, Charles and George	Steam engine, locomotive	VI.
Semple, Robert	Truss, gum elastic, for hernia	XX.
Shaw, William	Hinges and tubes	II.
Sheldon, Philo G	Spinning and twisting straw, &c	III.
Sheppard, Forrest	Paint composition, metallic, &c	IV.
Sheldon, Job	Steam engine	VI.
Shultz, Gotlieb	Disengaging horses in navigating canals	VII.
Shermer, Anthony	Car, railroad, turning, &c	X
Shoavler, Emanuel	Press, tobacco flatener	XII
Shaw, Erastus M	Mortising and tenoning	XIV.
Simpson, Michl. H	Wool, cleaning	III
Skinner, Elijah	Cooking stove	V.
Skinner and Bean	Fire place	V.
Sleeper, John R	Grist mill	XIII
Small, John P	Corn sheller	I
Smith, John and William	Shovel, scoop	II.
Smith, John	Loom, weaving figured goods	III.
Smith, Thomas B	Cooking ranges	V.
Smith, John L	Propelling boats by screw wheel, &c	VII.
Smith, Benjamin M	Propelling paddle wheels, &c	VII.
Smith, John K	Brakes for cars	X.
Smith, Frederick	Grist mill, with small stones	XIII.
Smith, Josiah C	Beds, palm leaf	XVII.
Smith, Bartholomew	Feathers, dressing and purifying	XVII.
Smith, Benjamin M	Truss for hernia	XX.
Sneed and Carpenter	Thrashing machine	I.
Snyder, Joseph	Fire place, for grates	V.
Snyder, Benjamin F	Saw mill, dog block	XIV.
Snyder, John, Jr	Washing machine	XVII.
Southwick, Thomas M	Stoves, anthracite, wrought iron for	V.
Southwick and Richardson	Shingles, metallic, for roofs	XIV
Soule, A. W	Washing machine	XVII.
Sperry, Samuel A	Plough, coulter and shares	I.
Spencer, Anson W	Boiler, portable	V.
Spoor, Abraham D	Cooking stove, salamander	V.
Spicer, Isaac	Washing machine	XVII.
Squier, John	Barrels, manufacturer	XIV.
Stearns, Clifton C	Churn	I.
Sturdivant and Holmes	Cutting grass	I.
Stahl and Diffenbacher	Plough	I.
Steward, David	Flasks and patterns, &c	II.
Steere, Seril	Window blinds, &c	II.
Stoddard, James S	Window sash, &c	II.
Stevens, Munson L	Window sash, &c	II.
Stith, Ferdinando	Flax and hemp, breaking	III.
Stone, Amasa	Loom power, and taking up	III.
Steele, John, Jr	Sugar boiling, &c	IV.
Strong, Kellog	Grid iron, rotary	V.
Stone, Samuel	Theodolite	VIII.
Stimpson, James	Railroad, turning short curves	IX.
Steere, Sevil	Window and door blinds	IX.
Stanley and Howard	Horse power, endless leather	XIII.
Stedman, Fisher	Planing machine	XIV.
Stedman, Aaron	Bedstead, machine	XVII.
Steel, Wm	Brush, art of making	XVII.
Strong, E. B	Grater	XVII.
Stone, James	Water closet, portable	XVII.
Sutherland, Daniel	Stoves and fire-place	V.
Sutton, Melancthon	Coopering, working off tool	XIV.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Swett, Nahum	Hair, extracting, &c	III.
Sweet, Joseph	Staves, dressing	XIV.
Sweet, Peleg	Brick striker	XV.
Swimley and Everhart	Mortar, mixing, &c	XV.
Swett, Samuel, Jr	Ironing clothes	XVII.
Taylor and Cowles	Corn sheller	I.
Taylor, Theodore	Saw set	II.
Taylor, Timothy	Harness, hames, fastening, &c	XVI.
Teasdale, James C.	Ruling machine for paper	XVIII.
Tefft, Jarius S.	Plough	I.
Thompson, Resin	Anodyne, and alterative syrup	IV.
Throckmorton, Reid R.	Planing machine	XIV.
Throckmorton, Reid R.	Planing machine	XIV.
Tinkler, Joseph	Plough	I.
Tiers, Arundius	Wheels for railroad cars, &c	X.
Tompkins and Gilroy	Loom, damask	III.
Todd and Peabody	Oil, linseed, substitute for	IV.
Town, Ithiel	Bridges	IX.
Townsend, Luther	Currier's knife, and double trimmer	XVI.
Trowbridge, Wm. C	Pump, rotary	XI.
Trahern, A., H. Heberling, W. E. Lukens, and J. Heberling	Horse power	XIII.
Turner, Joseph	Churn	I.
Turner, Joseph	Corn sheller	I.
Turk, John	Smut machine	I.
Tustin, John	Railroad, platform, &c	IX.
Turner, Elisha	Power by weights, &c	XIII.
Tyler, Joseph	Thrashing machine	I.
Ustick, Stephen	Straw cutter	I.
Ustick, Stephen	Straw cutter	I.
Vale, Charles	Ovens, portable	V.
Vancleve, Aaron W.	Boring rocks	IX.
Van Dusen, Washington	Marine railway	IX.
Vanhorn, A. L	Saddles, riding, of gum elastic, &c	XVI.
Walker and Brayley	Hulling cloverseed, &c	I.
Walker, Wm	Plough	I.
Warren, Edmund	Thrashing machine	I.
Watson and Robinson	Forge and other furnaces, &c	II.
Wapples, Jas. W	Spark catcher	VI.
Wade, Horatio B	Cooking stove	V.
Walker, S. T	Hydrants	XI.
Walker, David M	Pump, rotary	XI.
Walley, Samuel S	Bands, spiral, wheel	XIII.
Wales, Benjamin	Horse power	XIII.
Wade, Abraham	Pendulum power	XIII.
Wadsworth, William	Brick press	XV.
Ward, Ulysses	Brick press, and delivering	XV.
Waring, John	Refrigerator	XVII.
Warren, David	Washing machine	XVII.
Wade, Orin D	Washing machine and fulling	XVII.
Warren, Joseph	Printing apparatus	XVIII.
Wallace, Victor M	Pistols, pocket	XIX.
Ward, Allen	Garments, measuring, & marking out coats	XXI.
Webber, Henry	Cheese, turning and curing	I.
West, Stacy	Hulling cloverseed	I.
West and Von Sickle	Stoves	V.
Weemes, John W	Press, tobacco	XII.
Weaver, Geo. M	Corn, grinding, &c	XIII
Weber, Adam	Clay, potter's, purifying	XV.
Webher, Henry	Cheese, machine for turning, &c	XVII.
Whitman, Ezra, Jr	Churn, propelling, and cradles	I.
Whiteman, John	Hulling cotton, clover, &c	I.
Whitehill, James	Thrashing machine	I.
Whittimore, Wm. Jr	Gin, cotton roller	III.
Whitman, David	Loom, power	III.

PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
Whiten, Nathaniel D.	Baker, tin	V.
Whiting and Mears.	Cooking stove	V.
Whipple, C. J. Sprague and M. T. Whipple	Lathe, turning irregular forms	XIV.
Whitman, Samuel	Mortar machine, &c.	XV.
Whitman, Ezra, Jr., assignee of Ezra Whitman	Washing machine	XVII.
White, John	Coffins of artificial stone, &c	XXII
White, John	Coffins from hydraulic cement	XXII
Wilson, Wm	Flat or sad iron, &c	II.
Wilkinson, Jeptha A.	Loom, reeds, heddles or harness	III.
Williams, Elijah	Potash, manufacturing, &c	IV.
Wing, Paul	Cooking stove	V.
Wiatt, Haut C.	Spark catdher,	VI
Wilson, Wm	Steam wheel	VI.
Witty, R. T. L.	Bridges, &c	IX.
Wilkinson, David	Canals, lock, gate	IX.
Withers, John	Car, railroad	X.
Williams and King	Carriages, machinery, &c	X.
Wing, Warren P.	Spindle and bush, &c., for mills	XIII.
Wilder, Mark	Pegs, shoe, splitting	XIV.
Wilkinson, Wm. W.	Shingles and staves, shaving	XIV.
Williamson, Peregrine	Pen, metallic	XVIII.
Wilkinson, Vernum	Truss, gum elastic, hernia	XX.
Wood, Isaac	Churn	I.
Woods and Talbot	Brads, cutting, &c	II.
Wolcott, Freeman	Cloth, manufacturing	III.
Wolcott, Anson	Alcohol, extracting from apples	IV.
Wood and Dart	Water power, application to mills	XI.
Woods, Sidney	Lever power, engine, and self-regulating, &c	XII.
Woodward, Joel	Saddles, spring	XVI.
Wood, John W.	Truss for hernia	XX.
Wright and Ketchum	Pistons for steam engines	VI.
Wright, Peter M.	Grist mill, family	XIII.
Wright, Imla	Mortising machine	XIV.
Wright, Charles C.	Bills of exchange	XVIII.
Wyman, Oliver	Churn	I.
Yale, Linus	Saw mills	XIV.
Young, Mason	Float, rotary, spiral spring, &c	VI.

[H.]

CLASSIFIED LIST OF PATENTS,

GRANTED DURING THE YEAR 1849, WITH THE NAMES OF PATENTEES, PLACES OF RESIDENCE AND DATES OF PATENTS.

CLASS I.—AGRICULTURE, *including instruments and operations.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bee-hives	Stephen Titcomb	Farmington, Me	Ap'l 10, 1849
Bee-hives	Arza Gilmore	Wayne, Me	June 5, "
Bee-hives	George Wheeler	Little Valley, N. Y.	July 3, "
Bee-hives	Joseph A. Dugdale	Selma, Ohio	July 31, "
Bog cutters	John D. Filkins	Lima, Ind	Jan. 9, "
Bog cutting machines	Abner Follet	Windham, Conn	Oct. 16, "
Butter working machines	Elias H. Merryman	Springfield, Ill.	Nov. 27, "
Churns	Charles Murdock	Baltimore, Md.	Feb. 20, "
Churns	Henry F. Baker	Centreville, Ind	Ap'l 10, "
Churns	Samuel Huff	New Vienna, Ohio	Ap'l 24, "
Churns	Chapman Warner	Louisville, Ky	June 12, "
Churns	George E. Gill and Jos. B. Tillinghast	Chillicothe, Ohio	June 19, "
Churns*	Zenas C. Robbins	Washington, D. C.	June 26, "
Churns	Alexander Hall	Lloydsville, Ohio	Oct. 9, "
Churns, atmospheric†	Joseph C. Coult and Augustus B. Davis	Spring Garden, Pa.	May 15, "
Churns, atmospheric	Sam'l P. Francisco	Reading, Pa	June 19, "
Churn dashers	Josiah A. Gridley	Southampton, Mass.	May 1, "
Churn dashers	Henry Stanton	Richfield, N. Y	Dec. 18, "
Churn dashers, adjustable	Thomas G. Clinton, Geo. H. & Edw. H. Knight	Cincinnati, Ohio	Oct. 2, "
Churn dashers, atmospheric	William M. Wright	Pittsburg, Pa	Sep. 11, "
Churn dashers, rotary	Lewis W. Colver	St. Louis, Mo	Sep. 18, "
Churn dashers, rotary	D. N. Egbert	Hudson, Ohio	Sep. 18, "
Cotton scrapers	William C. Finney	Fayette co., Tenn.	Ap'l 24, "
Cultivators	David B. Rogers	Seneca Falls, N. Y.	Jan. 16, "
Cultivators	Jeremiah Warner	Reading, Pa.	Mar. 13, "
Cultivators	George W. Brown	Tylerville, Ill	June 5, "
Cultivators, cotton	Samuel W. Akin	Maury co., Tenn	Mar. 20, "
Cultivator teeth	Joseph S. Honey	Hartford, Ohio	Ap'l 17, "
Dill-barrows	George Colby	Fayetteville, Pa	June 12, "
Drills, grain	Albert G. Bartlett, Otis D. Ballo, administrator of the estate of	Cumberland, R. I.	Mar. 10, "
Drills, grain	Edward Stacy	Strasburg, Pa	June 5, "
Drills, grain	Aaron Palmer	Brockport, N. Y	June 19, "
Drills, grain, devices for sowing seed in	Pierpont Seymour	East Bloomfield, N. Y	Sep. 25, "
Drills, seed	Daniel Custer	Franklin co., Pa	Nov. 13, "
Drills, seed	Jacob Mumma	Hummelstown, Pa.	Nov. 20, "
Fruit, paring and coring	Peter W. Hardwick	Wayne co., Ind	Sep. 25, "
Grain carriers, construction of	Adam Linbart & Samuel McClain	Fulton, Ohio	Sep. 25, "
Grain, destroying weevil in	William Watson	Chicago, Ill	May 8, "
Grain gatherers	William Herries	Fayette, N. Y	Mar. 13, "
Grain separators	Daniel Woodbury	Perkinsville, Vt	Mar. 27, "
Grain separators	Homer Smith	Hector, N. Y	May 15, "

* Antedated June 1, 1849. † Antedated March 19, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Grain separators	Samuel W. Foster	Scio, Mich	Dec. 4, 1849
Harvesters	James L. and Henry K. Fountain	Rockford, Ill	May 15, "
Harvesters	Nelson Platt	Ottawa, Ill	June 12, "
Harvesters	Pells Manny	Waddams Grove, Ill.	June 26, "
Harvesters, clover	Samuel Krauser	Reading, Pa	Dec. 18, "
Harvesters of clover-heads	John Hinton	Monroe co., Va	May 22, "
Harvesting machines	Oliver Barr	Aurora, Ill	Jan. 16, "
Harvesting machines	Jonathan Haines	Union Grove, Ill	Mar. 27, "
Harvesting machines	Alfred J. Purviance	Updegraffs, Ohio	May 22, "
Harvesting machines, grain carriers for	Jacob J. and Henry F. Mann	Clinton, Ind	June 19, "
Harvesting machines, form of teeth in	Eliakim B. Forbush	Buffalo, N. Y	Nov. 27, "
Hulling machines	Dan Pease, Jr	Floyd, N. Y	April 3, "
Hulling machines	Dan Pease, Jr	Floyd, N. Y	Ap'l 10, "
Hullers, rice	Charles Walker	Brooklyn, N. Y	Aug. 14, "
Hullers, rice	D. H. Southworth and James R. Hitchcock	New York, N. Y	Nov. 6, "
Manures, artificial	Philip S. and William H. Chappell	Baltimore, Md	Mar. 27, "
Milking cows, instruments for	Cyrus Knapp	New York, N. Y	Nov. 27, "
Mowing machines	Daniel K. and John K. Harris	Allensville, Ind	Nov. 6, "
Ox yokes	John Chase	Craftsburg, Vt	Nov. 20, "
Ox yoke fastenings	Andrew Hotchkiss	Sharon, Conn	July 17, "
Pea vines, machine for gathering	John B. Stanley	Copiah co., Miss	Jan. 9, "
Planters, corn	B. F. Partridge	Syracuse, N. Y	Jan. 9, "
Planters, seed	Ebenezer J. Dickey	Hopewell cot'n w'ks, Pa	Jan. 23, "
Planters, seed	Jacob C. Miller	Marietta, Pa	Jan. 23, "
Planters, seed *	James D. Willoughby	Chambersburg, Pa	June 5, "
Planters, seed	David Diehl	Hanover, Pa	June 12, "
Planters, seed	Emanuel Myers	Union Mills, Md	June 19, "
Planters, seed	R. H. Springsteed	Wooster, Ohio	July 24, "
Planters, seed	James P. Ross	Lewisburg, Pa	Sep. 25, "
Planters, seed	John W. Sherman	Ontario, N. Y	Nov. 6, "
Planters, seed	Jacob Peirson	Wilmington, Del	Dec. 25, "
Ploughs	Jesse Layman	Lebanon, Ohio	Jan. 2, "
Ploughs	William Richter	Williamsburg, Ind	Jan. 9, "
Ploughs	Herman B. Sinclair	Lyndonville, N. Y	Jan. 9, "
Ploughs	Joseph C. Cloud	May's Landing, N. J.	Feb. 6, "
Ploughs	Wm. T. Sprouse	Petersburg, Ill	Mar. 13, "
Ploughs	John Rich	Troy, N. Y	July 31, "
Ploughs	Jesse Warren	Glenn's Falls, N. Y.	July 31, "
Ploughs	Benjamin Seyler	Franklin co., Pa	Oct. 16, "
Ploughs, attachment of harrows to	Jacob Stroop	Philadelphia, Pa	June 26, "
Ploughs, combined	Abner Leland	Milton, Pa	Jan. 2, "
Ploughs, corn	Stephen Coats	Lafayette, Wis	June 5, "
Ploughs, hill side	Daniel Robb	Sangamon co., Ill	June 26, "
Ploughs, hill side	Allen Eldred	Little Falls, N. Y	July 24, "
Plough, hill side	John W. Thurman	Buchanan, Va	Aug. 28, "
Plough, land side	Abraham Christ	Unity, Ohio	Sep. 18, "
Ploughs, rotary cutter	Thomas J. Tuthill	Elmira, N. Y	Feb. 6, "
Ploughs, seed planter, combined	William Croasdale	Hartsville, Pa	Nov. 27, "
Ploughs, corn, subsoil	Henry Bacon	Tecumseh, Mich	June 5, "
Rakes, horse	Sam'l H. Grinnell	Charlestown, N. H.	Feb. 20, "
Rakes, horse	Calvin Delano	E. Livermore, Me	Feb. 27, "
Rakes, horse, harness adapted to	Warren Parker	Putney, Vt	June 20, "
Rake, teeth, spring	Lyman Baker	Newbury, N. H	May 8, "
Scythe nibs	David Sawyer	Cornish, N. H	May 22, "
Scythe sneaths	Luther Cole	Lafayette, N. Y	Nov. 20, "
Straw cutters	Israel J. Richardson	New York, N. Y	April 2, "
Straw cutters	Jonathan White	Antrim, N. H	May 15, "

* Improvement added, November 20, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Straw cutters	Lewis Tupper	Auburn, N. Y	Aug. 28, 1849
Straw cutters	Thos. and Ed. Burrel	Seneca, N. Y	Sep. 11, "
Straw cutters	Jonathan Sullivan	Davidson co., N. C.	Oct. 30, "
Thrashing and grain separating machines	Israel J. Richardson	New York, N. Y	Mar. 27, "
Thrashing machines	Thomas N. Shipton	Lewistown, Pa	Ap'l 10, "
Thrashing machines	Abraham Bloom	Newville, Pa	Aug. 28, "
Vegetable cutters	Wyllys Avery	Salisb'y Centre, N. Y	July 17, "
Vegetables, cutting, crushing and grinding	Luther B. Fisher	Freeport, Ill	July 17, "
Wheat cleaning machines	David L. Ewing	Spruce Hill, Pa	July 17, "
Winnowing machines	Benjamin D. Sanders	Holliday's Cove, Va.	June 19, "
Winnowing machines	John W. Fisk	Rileytown, Ohio	July 3, "
Winnowing machines	Abraham Straub	Milton, Pa	July 17, "
Winnowing machines	A. J. Howell	Spruce Hill, Pa	Nov. 6, "
Winnowing machines, motion of riddles in	Alexander Moffitt	E. Bethlehem, Pa	Sep. 6, "

CLASS II.—METALLURGY, *and Manufacture of Metals and Instruments therefor.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Alloys, metallic	Herman B. Babcock	New York, N. Y	June 5, 1849
Awl haft—see class XVI.			
Bands, wrought iron, machine for contracting the circumference of	Wm. Massey	Green co., Ill	July 3, "
Bell telegraph	Harvey Houghton, Lucretia Houghton, administratrix of	Truxton, N. Y	Mar. 20, "
Blast generators—see class XI.			
Blinds, apparatus for opening and closing	Cheney Reed and Elias Howe, Jr	Cambr'geport, Mass.	Sep. 25, "
Bolt machines, method of constructing and operating the header in	David L. Weatherhead	Providence, R. I	May 8, "
Bolt and rivet machines, rotating disk	Jacob G. Day, assignor to John L. Kingsley	Brooklyn, N. Y. New York, N. Y	July 3, "
Buckles, suspender, &c.—see class XXI.			
Casting chilled rolls, method of giving a rotary motion to the melted iron in	John C. Parry	Pittsburg, Pa	Oct. 16, "
Castings, thin iron, process for making	Henry and William E. Bleeker and Samuel D. Vose	Albany, N. Y	Dec. 25, "
Casting, preparing metallic patterns for*	Theodore G. Bucklin	West Troy, N. Y	May 8, "
Chills, for casting rasps, files, &c.	Ezra Ripley	Troy, N. Y	June 5, "
Cores, moulding and compressing	Chapman Warner	Louisville, Ky	Jan. 9, "
Curry combs	Andrew Hotchkiss	Sharon, Conn	Mar. 13, "
Curry combs	Wm. Beach	Philadelphia, Pa	Mar. 13, "
Door holder	Edmund Morris	Burlington, N. J	June 19, "
Fastener, curvelinear blind opener and shutter	Robert B. Rollf	Cincinnati, Ohio	Ap'l 17, "
Fastener, stopper, sash	Wm. E. Arnold	Rochester, N. Y	Mar. 27, "
Fastener, stopper, sash	Wm. Ferrell	Burlington, N. J	Ap'l 17, "

* Antedated November 8, 1848.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Fastener, sash, eccentric	Lewis B. Page	Hartford, Conn	Sept. 4, 1849
Fastener and stopper, self-acting sash	James C. Cochrane	Rochester, N. Y.	Aug. 21, "
Fastener, combined sash and inside shutter	James Bell, assignor to Alfred D. Baldwin	New York, N. Y.	Aug. 21, "
Fastener, window shutter	Jacob Stroop	Philadelphia, Pa	July 10, "
Fastening and moving window blinds, method of	Cheney Reed	Cambridge, Mass	May 15, "
Fastening, opening and shutting blinds, method of	Wesley Chase	Buffalo, N. Y.	May 22, "
File cutting machines	George Crosby, Camillus Kidder, administrator of	Baltimore, Md	Dec. 4, "
Furnace, for smelting zinc	Seth Boyden	Newark, N. J.	Mar. 13, "
Furnaces, puddling and re-heating, combination of	Lewis Scofield and Edward Cooper	S. Trenton, N. J. New York, N. Y.	April 3, "
Furnace blast, combination of a double traveling hearth, with a	Lorenzo Sibert	Woodstock, Va	Nov. 20, "
Gold washer	Wm. H. Jennison	New York, N. Y.	Ap'l 3, "
Gold washer	Lewis Jennings	New York, N. Y.	May 1, "
Gold washer	Wm. Ball	Chicopee, Mass	June 19, "
Gold washer	Michael English	Lagro, Ia	Aug. 28, "
Gold washers	Louis Lacharme	St. Leger. de Feugeret, France	Oct. 2, "
Gold washers, arrangements of the conductors in centrifugal	Lemuel P. Jenks	Boston, Mass	Oct. 2, "
Gold washer, concentric centrifugal	James H. Bull	New York, N. Y.	Ap'l 3, "
Gold washers, rockers of	Thomas J. Green	Jamaica Plain, Mass.	Oct. 16, "
Gold washer, rotary	Harrison Parry	Pittsburg, Pa	Ap'l 10, "
Hinge, combined fastener and shutter opener	A. S. Pelton	Clinton, Conn	Jan. 23, "
Hinges, machine for forming the eyes of	David W. Lyon	West Troy, N. Y.	Sep. 11, "
Hinge and spring, combined double	Andrew B. Taft	New York, N. Y.	Jan. 23, "
Iron, cast, process for welding to wrought, or steel	M. Fisher and W. Martin, Jr.	Newport, Me	Jan. 23, "
Iron, machinery for drawing out and compressing heated	Henry Burden	Troy, N. Y.	Oct. 16, "
Iron, malleable, process for making direct from the ore	Moses S. Salter, assignor to Moses S. Salter, Horace Norton & Jno. W. Poinier	Newark, N. J.	Nov. 20, "
Keyhole protector	Edward Kershaw	Boston, Mass	May 22, "
Knobs, shank for mineral door	Joshua Laird	Cincinnati, Ohio	May 22, "
Knobs, method of attaching to doors	James A. Crever	Pittsburg, Pa	Oct. 16, "
Latch, bolt spring	Elias M. Ray	Norfolk co., Mass	Oct. 23, "
Locks, bank	Henry Ritchie, assignor to Henry C. Jones	Newark, N. J.	April 3, "
Lock, bank	David M. Smith	Springfield, Vt	April 3, "
Lock, combination revolving tumbler	Linus Yale	Newport, N. Y.	Feb. 13, "
Lock, door	Sylvester M. Pye	Aquackanock, N. J.	Mar. 13, "
Lock, door	Edwin B. Horn	Boston, Mass	Sep. 25, "
Locks, door, by which one keyhole serves for two distinct keys	Amos Call	Springfield, Mass	Feb. 13, "
Locks, door, protector slide for	George F. J. Colburn	Newark, N. J.	Feb. 27, "
Lock, door, by a combined key and guage; also a thief detector	Francis Charles Goffin	Philadelphia, Pa	Mar. 10, "
Lock, double bolt trick	Lewis M. Hartley	Kensington, Pa	Dec. 11, "
Lock, eccentric piano	Peter H. Niles	Boston, Mass	Aug. 7, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Lock, a, machine for turning on sheet metal	John Wright, assignor to Francis Leonard and Daniel Hughes	Rochester, N. Y.	Mar. 10, 1849
Lock, pad	F.C. Goffin & C. Liebrick	Philadelphia, Pa	June 12, "
Lock, right or left hand*	L. R. Livingston, John Jay Roggen and Calvin Adams	Pittsburg, Pa	May 1, "
Lock, rotating permutation plate	Henry Ritchie, assignor to Henry C. Jones	Newark, N. J.	June 26, "
Locks, means of changing the combination in revolving tumbler	Lewis Lillie	Troy, N. Y.	Nov. 13, "
Metals, process of burnishing	Edward Satterlee	Albany, N. Y.	Mar. 20, "
Metals, process of hardening	Asa Wheeler	Warwick, Mass	July 31, "
Metal or wood, machine for carving—see class XIV., "Carving, &c."			
Metallic plates, method of uniting to each other	Samuel Pratt	Cohassett, Mass	Aug. 14, "
Mill for rolling irregular shapes by means of a cam pattern †	John S. Hall	Columbus, Ohio	Jan. 30, "
Nail, cut, from Muntz's metal	Samuel L. Crocker	Taunton, Mass	Ap'l 17, "
Nail plate feeder	Hannah and Charles M. Diehl, administrators of William Diehl, dec'd	Norristown, Pa	Ap'l 10, "
Nuts and bolt heads, machine for dressing	Julius King	Bordentown, N. J.	Feb. 27, "
Ores, reduction of ‡	Alexander Parker	Birmingham, Eng	Jan. 30, "
Ore separator, electro-magnetic	Ransom Cook	Plattsburg, N. Y.	Feb. 20, "
Ore washers	Jacob Pritchett	Philadelphia, Pa	Oct. 9, "
Ore washers	Peter Von Schmidt	New York, N. Y.	Oct. 16, "
Ox-shoe machine, roller, with movable dies	Philip Pitts Read	Bowdoin, Me	Jan. 23, "
Pipes, &c.—see class XI.			
Pipe, lead—see class XII., "Press, centripetal."			
Punching machine	Stephen Kendall	Kalamazoo, Mich	April 3, "
Punching machine with a combination of adjustable guages	Richard S. Tilden	St. Louis, Mo	Mar. 10, "
Roses for doors, porcelain, method of mounting	James Bell	New York, N. Y.	Apr. 3, "
Saw-set—see class XIV.			
Screw cutting machine, feeder and nippers for	William Van Anden	Trenton, N. J.	Mar. 27, "
Screw wrench for grasping cylindrical forms	Fred'k H. Bartholomew and Solyman Merrick	New York, N. Y. Springfield, Mass	Jan. 2, "
Shears, circular and beading tool combined	Joseph F. Flanders	Newburyport, Mass.	Jan. 2, "
Skelps from which iron tubes are made, method of bending	James McCarty	Reading, Pa	Jan. 9, "
Skelps, tube, dies for bending	Joseph McCulley	Philadelphia, Pa	Jan. 9, "
Spikes, hook-heading by one motion, machine for	Jonathan Beardsley	Trenton, N. J.	Jan. 9, "
Spike machine	Marcus Maxim	New Castle, Pa	Mar. 10, "
Spikes, instrument for drawing	Patrick Bryant	Chesterfield, Mass	Apr. 10, "
Spike machine, revolving die	A. M. George and Eph'm Brown—A. M. George assignor to N. and D. Richards, E. Waterman and A. Tay; and D. Richards, E. Waterman, and A. Tay, assignors to N. Richards; and E. Brown, assignor to Lucius C. Alexander	Nashua, N. H. Lowell, Mass. Medford, Mass. Nashua, N. H.	May 18, "

* Improvement added June 5, 1840—see additional Imp. † Re-issued Dec. 4, 1849. ‡ In England, Nov. 18, 1847

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Spike machines, rotating	Edwin B. White	Nashua, N. H.	Aug. 28, 1849
Spike machine, double cylinder	Edwin B. White	Nashua, N. H.	Oct. 16, "
Spike machines, operating the hammers of	Harry A. Wills	Keesville, N. Y.	Dec. 11, "
Spoons, method of making wire strengthened	William Mix	Prospect, Conn.	May 1, "
Springs, spiral, machine for making of wire	William Van Anden	Trenton, N. J.	Aug. 7, "
Steel, process of making*	Norman M. Isham and Erastus E. Marcy	Hartford, Conn.	Oct. 2, "
Stopper, sash, spring and stackle	John W. Hoffman	Philadelphia, Pa.	July 10, "
Stoppers—see "fasteners."			
Tools, machine for grinding and polishing—see class XIV.			
Tuyere, angular rotating	Samuel H. Camp	Hartford, Conn.	Aug. 21, "
Tuyeres conical valve in	Robert D. Porter	Harper's Ferry, Va.	Mar. 27, "
Tuyere, blacksmiths' rotary	Ephraim Harris	Springfield, Mass.	Jan. 9, "
Window sash, method of counterbalancing	William T. Barnes, assignor to Wesley Chase	Buffalo, N. Y.	Dec. 4, "
Wire ropes, tops for	John A. Roebling	Saxonburg, Pa.	Feb. 6, "
Wrench, hinged claw	Adam Hay	Newark, N. J.	Jan. 30, "
Wrench, sliding	Dexter H. Chamberlain, assignor to William A. Dodge	Boston, Mass.	Mar. 20, "

* In England, November 2, 1848.

CLASS III.—MANUFACTURES OF FIBROUS AND TEXTILE SUBSTANCES, *including Machines for Preparing Fibres of Wool, Cotton, Silk, Fur, Paper, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bags and sacks, manufacture of	Wm. B. Carlock	New York, N. Y.	July 3, 1849
Bobbins, &c., cutting out cylinders for	Lewis Brown	Epsom, N. H.	Ap'l 24, "
Bobbins, driving	Arthur M. Eastman	Boston, Mass.	Ap'l 17, "
Bobbins, machinery for boring	Curtis E. Norris	Peacham, Vt.	Ap'l 24, "
Burring cylinders	Charles G. Sargent	Lowell, Mass.	Oct. 9, "
Burring machines, guards or strippers for	Alexander Wright	Lowell, Mass.	Jan. 21, "
Carding engines	Jeptha Dyson	Fulton, S. C.	Feb. 20, "
Carding machines	Thomas G. Boone	Brooklyn, N. Y.	Mar. 20, "
Carding machines	John McCarty	Somerset, Pa.	June 19, "
Carding machines	Daniel W. Hayden	Windham, Conn.	Oct. 2, "
Cards, &c., cylinders for carrying and supporting	Stephen R. Parkhurst	W. Bloomfield, N. J.	Jan. 23, "
Cloth, apparatus for dressing	John Johnston and John D. Snyder	Saltsburg, Pa.	Mar. 13, "
Cloth, machinery for dressing and folding	John and Hiram H. Higgins	E. Greenwich, R. I.	Mar. 10, "
Cord, machinery for making	Wm. E. Nichols	E. Haddam, Conn.	Dec. 11, "
Cotton batting	H. B. Lawton and H. T. Lawton	Cahoes, N. Y. Troy, N. Y.	Mar. 13, "
Cotton, machinery for spinning	Charles R. Tisdale, Jas. and Thomas Keane—James and Thomas Keane, assignors to C. R. Tisdale	Cornwall, N. Y.	July 17, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Cylinders, toothed, mode of making	John L. Tuttle	Lawrence, Mass.	Oct. 30, 1849
Drawing frames, stop motion for	Charles Danforth	Paterson, N. J.	Jan. 9, "
Drawing heads, mode of changing the gearing of, while in motion	Alfred Jenks	Bridesburg, Pa.	Dec. 11, "
Drying machines	Nelson E. Chaffee	Ellington, Conn.	Feb. 13, "
Flax and hemp, manufacture of	Robert Patterson	N. Hartford, N. Y.	Dec. 18, "
Flax, &c., machinery for spinning	Charles Clark	West Troy, N. Y.	Oct. 2, "
Fringe, shawl, machinery for twisting	Milton D. Whipple, assignor to Bay State Mills	Lowell, Mass.	Nov. 27, "
Gins, cotton	Malcolm McAulay	Thomas co., Ga.	Ap'l 24, "
Gins, cotton	Wm. Y. Layton	Darlington, S. C.	May 22, "
Gins, cotton	Stephen R. Parkhurst	New York, N. Y.	Sep. 11, "
Guides for warpers	Whiting Hayden	Windham, Conn.	Mar. 27, "
Hair, machinery for cleaning	Johu Radebaugh and J. A. Matlack	Lancaster, Ohio	Ap'l 17, "
Heddles, wire, machinery for making	Abijah J. Williams	Utica, N. Y.	Sep. 11, "
Hemp brakes	Augustine Smith	Mobile, Ala.	Nov. 20, "
Hemp, machinery for spinning	Wm. Pedrick and Thos. M. Melvin	Charlestown, Mass.	Feb. 6, "
Hemp, machinery for breaking and dressing	Allen Eldred	Openheim, N. Y.	Ap'l 24, "
Hemp, machinery for spinning	Wm. C. Hibbard	Boston, Mass.	Ap'l 24, "
Hemp, machinery for spinning	Garret Van Riper	Jersey city, N. J.	Dec. 4, "
Hemp machines	James Anderson	Louisville, Ky.	Nov. 13, "
Knitting needles	James Hibbert	Providence, R. I.	Jan. 9, "
Lapping machines	Samuel Campbell	N. York Mills, N. Y.	Oct. 9, "
Looms	Alfred Bigelow and Justus Butler	Granville, Ohio	Jan. 16, "
Looms	John Wilson	S. C.	May 29, "
Looms	Augustus Faulkner	Walpole, N. H.	Oct. 23, "
Looms	Henry Bachofner	Springfield, Mass.	Oct. 30, "
Looms, apparatus for operating shuttle boxes of*	Robert B. Goodyer, assignor to James A. Bowie and Chas. Carr	Philadelphia, Pa.	Mar. 13, "
Looms, apparatus for operating shuttle boxes for	Andrew Allen, assignor to Chas. J. Gardiner	Philadelphia, Pa.	Sept. 4, "
Looms, for weaving figured fabrics	Moses Marshall	Lowell, Mass.	Dec. 11, "
Looms, for weaving figured fabrics	Richard Garsed	Frankford, Pa.	Nov. 6, "
Looms, for weaving Brussels carpets, &c. †	Erastus B. Bigelow	Boston, Mass.	Mar. 10, "
Looms, for weaving Brussels carpetings, &c. ‡	Erastus B. Bigelow	Boston, Mass.	Mar. 13, "
Looms, delivery and take up motion of	Amos H. Boyd	Saco, Me.	Mar. 10, "
Looms, let off motion of	Jeremiah Myers	Biddeford, Me.	Mar. 10, "
Looms, machines for weaving harness for	Simeon Holton, Jr., and Wm. R. Harris	Middlebury, Vt.	Sept. 4, "
Looms, for figured fabrics	Joseph Reynolds	Providence, R. I.	Oct. 16, "
Looms, Jacquard	Erastus B. Bigelow	Clintonville, Mass.	Oct. 23, "
Looms, for weaving	Augustus Faulkner	Walpole, N. H.	Ap'l 17, "
Looms, power	Roger Lightbown	Eaton, N. Y.	Oct. 30, "
Mats, &c., machinery for making	Daniel Hodgman and A. D. Wyckoff	New York, N. Y.	May 1, "
Mules, self-acting regulators for	Ebenezer C. Sanger	Salem, Mass.	July 3, "
Paper engines, bed plates for	Wm. Clarke	Dayton, Ohio	Oct. 9, "
Paper, machines for cutting	Alonzo Gilman, assignor Wm. Johnson	Troy, N. Y.	Sept. 4, "

* Antedated Sep. 13, 1848. † Re-issued Oct. 9, 1849. ‡ Re-issued Nov. 20, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Paper, machinery for taking and laying from the cutting engine..	John M. Hollingsworth, assignor to J. M. and L. Hollingsworth.....	Milton, Mass....... Boston, Mass........	Ap'l 17, 1849
Rope machinery..................	Wm. Joslin.............	Waterford, N. Y....	Mar. 10, "
Rope machinery..................	Benjamin Morison	Harrisburg, Pa.....	Mar. 13, "
Ropes, machinery for laying......	Martin Guild..........	Easton, Mass.......	May 8, "
Rope yarns, tarring..............	Wm. Montgomery, assignor to Wm. Montgomery and Geo. H. Williams...........	Roxbury, Mass.....	May 8, "
Sewing machines.................	Chas. Morey and Joseph B. Johnson...........	Boston, Mass.......	Feb. 6, "
Sewing machines.................	JothamS. Conant.......	Dracut, Mass......	May 8, "
Sewing machines.................	John Bachelder........	Boston, Mass.......	May 8, "
Sewing machines.................	Sherburne C. Blodgett and John A. Lerow...	Georgetown, Mass. Boston, Mass.......	Oct. 2, "
Speeder-fliers...................	Theodore T. Abbott....	Manchester, N. H..	May 22, "
Spindles, live and fliers*.........	William MacLardy and Joseph Lewis........	Manchester, Eng...	July 3, "
Spinning jack	Foster Nowell.........	Lowell, Mass......	Sept. 25, "
Temples, jaw for looms	George Draper	Ware, Mass........	Feb. 27, "
Temples, weavers'...............	Lewis K. and Preston Day.................	Sacarappa, Me.....	Feb. 27, "
Twine, manufacture of...........	Thomas G. Boon, assignor to Wm. C. Noyes..	Brooklyn, N. Y. New York, N. Y....	Ap'l 10, "
Waste, machinery for picking....	Joshua Bailey..........	Cohoes, N. Y......	July 3, "
Wool, &c., manufacture of cylinders for burring...............	Francis A. Calvert	Lowell, Mass......	Jan. 23, "
Wool cleaning and lapping machine.........................	Francis A. Calvert	Lowell, Mass......	Jan. 23, "
Wool, &c., machinery for picking.	Reuben Daniels and Albert G. Dewey.......	Woodstock, Vt. Hartford, Vt.......	April 3, "
Wool, producing a substitute for, from jute†....................	William O'Connor, administrator of the estate of Henri Meneau de Villeneuve, dec'd..	Jersey City, N. J... Paris, France......	Ap'l 24, "
Yarn, apparatus for spooling......	George H. Dodge......	Attleborough, Mass.	May 8, "

* In England, May 9, 1848. † In France, June 23, 1840.

CLASS IV.—CHEMICAL PROCESSES, MANUFACTURES AND COMPOUNDS, *including Medicine, Dyeing, Color-making, Distilling, Soap and Candle-making, Mortars, Cements, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Beer fountains, portable.........	David Gay.............	Bath, Me..........	Apr. 24, 1849
Brewing and preserving alcoholic drinks	John Hopkins..........	W. Brownsville, Pa.	May 8, "
Candles, mould, apparatus for making	Andrew L. Brown......	New Haven, Conn..	Oct. 2, "
Clarification of cane juices*.....	John Spangenberg......	Jefferson Parish, La.	Mar. 27, "
Compound, lubricating	Patrick S. Delvan	Reading, Pa........	Jan. 16, "
Compound, lubricating	Alonzo S. Grenville...	Westborough, Mass.	Jan. 30, "
Compounds, lubricating	John Cumberland & Wm. W. Cumberland......	Mobile, Ala. New Albany, Ind...	April 3, "
Composition for metallic packing in steam engines	Green S. Cox..........	Eufaula, Ala.......	Oct. 2, "

* Antedated 27th Sept., 1848.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Distilling apparatus	Charles A. Krechler ...	Stockholm, Sweden	July 10, 1849
Distilling apparatus..............	George Riley...........	New York, N. Y...	Ap'l 17, "
Distilling and rectifying spirits*..	Carl Falkman..........	Stockholm, Sweden.	Nov. 20, "
Distilling sea water, apparatus for	Robert B. Forbes and John Ericsson.........	Boston, Mass. New York, N. Y....	Oct. 23, "
Dyeing.........................	Samuel Mallerd.........	Staten Island, N. Y.	Mar. 27, "
Dyeing, apparatus for...........	Edward Brierly	Lowell, Mass......	Dec. 11, "
Fire-kindling materials—see class V.			
Freezers, ice cream..............	John Decker...........	Bell, Md...........	Aug. 21, "
Freezers, ice cream..............	Goldsmith Coffeen, Jr...	Blue Ball, O........	Nov. 13, "
Gas generators	John Watson & Edward Cart, assignors to Albert Woodhull & Chas. Minturn.............	Hull, England. New York, N. Y....	Sep. 18, "
India rubber, manufacture of †....	H. G. Tyer and John Helm...............	N. Brunswick, N. J.	Jan. 30, "
Lampblack and colophane, manufacture of..................	Edward Clark..........	Brooklyn, N. Y.....	Jan. 2, "
Marble imitation of—see class XV.			
Meats, salting...................	Thomas Davison.......	New York, N. Y...	Aug. 7, "
Paris green, manufacture of......	Theodore Schwarts.....	New York, N. Y...	Ap'l 17, "
Pearlash, manufacture of........	William A. Edwards....	Mt. Clemens, Mich.	Feb. 13, "
Pills or bullets, machine for, &c.—see class XIX., "Bullets or Pills, &c."			
Rotting hemp and other fibrous materials—apparatus & process.	Lemuel W. Wright.....	Plainfield, N. H....	Dec. 25, "
Steam-tables	Edwin Hills	Cincinnati, Ohio....	Aug. 14, "
Soda water, apparatus for making	Solomon Andrews and Job F. Halsey........	Perth Amboy, N. J.	Ap'l 17, "
Sugar, boiling	Knight Reed...........	New Haven, Conn..	Ap'l 24, "
Sugar-boiling, steam pipes for....	Alfred Stillman........	New York, N. Y...	June 12, "
Sugars, draining and blanching ‡..	John Spangenberg......	Jefferson Parish, La.	Mar. 20, "
Sugar-pans......................	Alfred Stillman........	New York, N. Y...	Aug. 28, "
Sugar, processes for the manufacture of §	John Scoffern..........	Up. Holloway, Eng.	Nov. 27, "
Vinegar, manufacture of.........	James Ruggles.........	Philadelphia, Pa....	Jan. 30, "

* In Sweden Aug. 5, 1848. † Re-issued, Aug. 7, 1849. ‡ Antedated September 29, 1848. § In Eng., Dec. 8, 1847.

CLASS V.—CALORIFIC, *comprising Lamps, Fire-places, Stoves, Grates, Furnaces for Heating Buildings, Cooking Apparatus, Preparation of Fuel, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Baking apparatus................	John P. Hayes..........	Boston, Mass.......	Jan. 30, 1849
Boilers, tin, for cooking stoves with cast iron bottoms, making..	Gibson North..........	Philadelphia, Pa....	Dec. 11, "
Chimney caps...................	Charles K. Scudder	Brooklyn, N. Y.....	May 15, "
Combustion of fuel*.............	Richard Coad, assignor to Sam'l G. Fisher....	Lambeth, England Mobile, Ala........	May 8, "
Destroying weevil in grain—see class I., Grain, &c.			
Driers, grain, endless bands for...	John Massey...........	New York, N. Y....	Ap'l 17, "
Drying grain....................	Henry Quinn...........	N. Alexandria, N. J.	Mar. 10, "
Drying grain....................	Joseph H. Patten.......	New York, N. Y....	June 19, "
Fire kindling materials..........	Levi T. Cheever........	E. Greenwich, R. I.	Feb. 20, "

* In England, November 25, 1847.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Fire proof safes *	Edward and Joseph L. Hall	Cincinnati, O.	Aug. 21, 1849
Fuel, consumption in steam boiler and other furnaces	Christian Burckhardt	Cincinnati, O.	June 5, "
Furnaces, air heating	Oliver Tiffany	New York—Post Office not stated	Mar. 20, "
Furnaces, air heating	Horace Bushnell	Hartford, Conn.	Mar. 27, "
Furnaces, portable hot air	John P. Hayes	Boston, Mass.	Mar. 20, "
Furnaces, registers for hot air †	Charles F. Tuttle	Williamsburg, N. Y.	Jan. 23, "
Furnaces, registers for hot air	Charles F. Tuttle	Williamsburg, N. Y.	Sep. 11, "
Gas burners ‡	Daniel H. Soliday	Philadelphia, Pa.	Mar. 20, "
Gas apparatus	Amaria Pierce	Philadelphia, Pa.	Feb. 27, "
Gas apparatus	Andrew Walker, Jr.	Burke, Vt.	Aug. 7, "
Grate bars	Cornelius Kingsland	Alleghany, Pa.	Oct. 16, "
Grates, coal, revolving horizontal	John F. Weishampel	Baltimore, Md.	June 19, "
Heating, apparatus for, by vapor of alcohol	Thomas K. Anderson	Painted Post, N. Y.	Feb. 13, "
Heating, &c.—see Warming, &c.			
Lamps, camphine	Edwin B. Horn	Boston, Mass.	Feb. 6, "
Lamps, gas	Horatio G. Sickel	Philadelphia, Pa.	Aug. 7, "
Lamps, gas, argand burners for	John G. Webb	Williamsburg, N. Y.	Aug. 7, "
Lamps, self-lighting	Alexander Bennett	New York, N. Y.	Mar. 27, "
Lamp wicks, elevator tubes for	Robert Cornelius and Charles Welhelm, assignors to Robert Cornelius and Isaac F. Baker	Philadelphia, Pa.	July 24, "
Lanterns, portable	Nathaniel Waterman	Boston, Mass.	Dec. 25, "
Lanterns, signal	George Callard	Buffalo, N. Y.	July 31, "
Lanterns, signal	Hugh Sangster	Buffalo, N. Y.	Dec. 18, "
Ovens, portable	Calvin Doane	Wareham, Mass.	Oct. 9, "
Ranges, cooking	John M. Dearborn	Boston, Mass.	Mar. 20, "
Ranges, cooking	Frederick S. Merritt	New York, N. Y.	April 3, "
Ranges, cooking	Philip Rollhaus	New York, N. Y.	Sep. 11, "
Ranges, cooking	Nicholas Mason	Roxbury, Mass.	Dec. 4, "
Smoke consuming apparatus—see class VI.			
Stoves	Adolphus Lotze	Cincinnati, O.	Oct. 30, "
Stoves	James Cole	Cincinnati, O.	Oct. 30, "
Stoves, coal grates for	Caleb Isbister	Alleghany city, Pa.	Ap'l 17, "
Stoves, cooking	Evan Louis Evans	Mount Holly, N. J.	Jan. 30, "
Stoves, cooking	Joseph Feinour	Philadelphia, Pa.	Jan. 30, "
Stoves, cooking	R. D. Granger	Albany, N. Y.	Jan. 30, "
Stoves, cooking	R. D. Granger	Albany, N. Y.	Jan. 30, "
Stoves, cooking	John L. Gerow	Marlborough, N. Y.	Jan. 30, "
Stoves, cooking	Wm. Stephenson	Cincinnati, O.	Jan. 30, "
Stoves, cooking	James White	Milton, Pa.	Feb. 6, "
Stoves, cooking	G. B. Whiteside	Brockport, N. Y.	Feb. 6, "
Stoves, cooking	Elisha Vance	Wilmington, O.	Feb. 6, "
Stoves, cooking	Wm. Cobb	Albany, N. Y.	Feb. 6, "
Stoves, cooking	James L. Norton	Perry township, Pa.	Feb. 27, "
Stoves, cooking	George E. Waring	Stamford, Conn.	Mar. 13, "
Stoves, cooking	Wm. E. Bleecker	Albany, N. Y.	Mar. 27, "
Stoves, cooking	Fitch R. Babcock	Westfield, Mass.	Ap'l 10, "
Stoves, cooking	B. T. Roney	Newtown, Pa.	Ap'l 17, "
Stoves, cooking	Horace Halbert	Utica, N. Y.	May 29, "
Stoves, cooking	Daniel Dunham	Pautucket, R. I.	May 29, "
Stoves, cooking	Jordan L. Mott	New York, N. Y.	June 12, "
Stoves, cooking	Ebenezer F. Martin	Rockport, Mass.	June 19, "
Stoves, cooking	Roswell Wilson	Albany, N. Y.	June 19, "
Stoves, cooking	William E. and Henry Bleecker and Samuel D. Vose	Albany, N. Y.	July 3, "
Stoves, cooking	Nicholas Mason	Roxbury, Mass.	Aug. 7, "
Stoves, cooking	David Johnson	Amsterdam, O.	Sept. 4, "

* Re-issued December 18, 1849. † Re-issued May 1, 1849. ‡ Antedated January 9, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Stoves, cooking	William Wheeler	Troy, N. Y.	Sep. 18, 1849
Stoves, cooking	William Sours	Mt. Jackson, Va.	Sep. 18, "
Stoves, cooking	Elias Kaighn	Camden, N. J.	Sep. 18, "
Stoves, cooking	James Leffel	Springfield, O.	Oct. 9, "
Stoves, cooking	Hannibal Mathews	Cincinnati, O.	Oct. 16, "
Stoves, cooking	Thos. G. Clinton, Geo. H. Knight and E. H. Knight	Cincinnati, O.	Oct. 16, "
Stoves, cooking	James R. Stafford	Cleveland, O.	Oct. 23, "
Stoves, cooking, flues for	Henry Bleecker	Albany, N. Y.	Sep. 18, "
Stoves, for heating apartments	James Shields and Jas. Cole	New York, N. Y. Cincinnati, O.	Mar. 10, "
Stoves, plates for boiler holes and tops of	John B. Chollar	West Troy, N. Y.	Feb. 6, "
Stoves, parlor cooking	Edward R. Brown	Albany, N. Y.	June 5, "
Stoves, self-acting registers for	Washburn Race, assignor to L. S. Bacon	Seneca Falls, N. Y. Le Roy, N. Y.	Feb. 20, "
Stoves, self-regulating dampers for	Benson Owen	Seneca Falls, N. Y.	June 19, "
Warming apartments, apparatus for	Samuel Whitmarsh	Northampton, Mass.	Feb. 13, "

CLASS VI.—STEAM AND GAS ENGINES, *including Boilers and Furnaces therefor, and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Alarm for indicating want of water in boilers	Azel S. Lyman	Upper Alton, Ill.	Dec. 18, 1849
Boilers, arrangement of flues in marine	R. F. Loper	Philadelphia, Pa.	Ap'l 17, "
Boilers and water-heaters of locomotive engines	Thatcher Perkins, assignor to Levi B. Tyng	Baltimore, Md. Lowell, Mass.	June 26, "
Boiler-flues, method of increasing the effective length of, and cleansing	Abner Chapman	Fairfax, Vt.	July 17, "
Boilers, steam, apparatus for ascertaining by inspection the saltness of water in	William Sewell, Jr.	Williamsburg, N. Y.	Feb. 6, "
Boilers, steam, method of regulating the supply of water to	Warren S. Bartle	Newark, N. Y.	Feb. 6, "
Boiler, steam, and furnace therefor, arrangement of	Horace Boardman	Plattsburg, N. Y.	Aug. 14, "
Boilers, tool for attaching tubes to	Thomas Prosser	New York, N. Y.	Ap'l 17, "
Cut-off, adjustable	Julius King	Bordentown, N. J.	Mar. 20, "
Cut-off, adjustable lever with secondary toe. No. 1	Horatio Allen	New York, N. Y.	Feb. 6, "
Cut-off, adjustable lever with secondary toe. No. 2	Horatio Allen	New York, N. Y.	Feb. 6, "
Cut-off, disk, acted upon and regulated by the governor	William McCammon	Albany, N. Y.	May 22, "
Cut-off, piston valve	Gordon McKay	Pittsfield, Mass.	Ap'l 17, "
Cut-off and steam stop of rotary engines	Joseph W. Webb, assignor to Benjamin Gould	Ledyard, N. Y.	May 15, "
Engine, arrangement of, for using steam expansively	John Ericsson	New York, N. Y.	Nov. 6, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Engines, auxiliary, arrangement and method of working the valves of, for feeding boilers...	Rufus Porter, assignor to Rich'd Van Dyke, Jr	New York, N. Y...	July 10, 1849
Engines, method of ensuring the action of the valves in the direct action pumping........	Henry R. Worthington and Wm. H. Baker...	New York, N. Y...	April 3, "
Engine, method of working the air pump, and using a condensing as a non-condensing..........	R. F. Loper...........	Philadelphia, Pa....	Aug. 28, "
Engines, method of reversing reacting rotary..............	C. M. Miles	Brockwayville, Pa..	Sept. 4, "
Engines, rotary valve motion cut-off and steam stops..........	Henry G. Thompson ...	New York, N. Y...	Dec. 18, "
Engines, steam, composition for metallic packing in—see class IV., "Composition," &c.			
Engines, vapour, condensers and stuffing boxes of*............	Jean Baptiste Louis Prosper Verdat du Trembley	Paris, France......	Dec. 4, "
Filtering apparatus for steamboat boilers....................	Paul K. Hubbs..........	Holmesburg, Pa....	Ap'l 24, "
Filters, arrangement of, for steam boilers.....................	Edmund Blunt	Brooklyn, N. Y....	Aug. 14, "
Firebox, removable for locomotives	John J. De Haven......	Reading, Pa.......	Ap'l 24, "
Fireboxes of steam boilers, removable water-lining for the.......	John J. De Haven......	Reading, Pa.......	Oct. 2, "
Fluid-metre....................	William H. Lindsay....	New York, N. Y...	Feb. 20, "
Furnace, multiple grate, for locomotive boilers................	Frederick Harbach.....	Cleveland, Ohio....	Jan. 30, "
Locomotives, cog-gearing of, for ascending inclined planes......	William Hoyt...........	Dupont, Indiana....	Ap'l 17, "
Locomotives for ascending inclined planes.....................	Andrew Cathcart.......	Madison, Ind.......	Oct. 23, "
Locomotive with driving axle above the boiler..............	Richard H. Emerson....	Portland, Me.......	May 1, "
Pistons, metallic packing for......	William Wright	Providence, R. I...	Feb. 27, "
Pistons, metallic, method of expanding.....................	James Tuchstone and Jacob H. Clark	Philadelphia, Pa....	Ap'l 17, "
Piston-ring, and method of deriving motion therefrom in rotary engines	John Tremper.........	Little Britain, N.Y..	Ap'l 17, "
Pistons and stuffing boxes, tubular packing for †	William C. Moat	Middlesex, Eng....	Dec. 25, "
Smoke consuming apparatus.....	Frederick P. Dimpfel..	Philadelphia, Pa....	Mar. 13, "
Spark arrester, horizontal........	T. W. Pratt	Springfield, Mass...	Mar. 13, "
Spark arrester, spiral............	Andrew McCleary	Philadelphia, Pa....	Mar. 13, "
Spark arresters.................	James A. Cutting	Boston, Mass.......	June 26, "
Spark arresters, deflectors for....	Samuel Swett..........	New York, N. Y...	July 24, "
Spark arresters, locomotive, and smoke conductors..............	Josiah F. Flagg........	Boston, Mass.......	Aug. 7, "
Spark and gas consumers........	David Matthew........	Baltimore, Md......	Feb. 13, "
Steam engines, rotary............	John C. Howard........	Williamsburg, N. Y.	April 3, "
Steam engine, an auxiliary, employment of, in combination with the condenser pump..........	John Ericsson..........	New York, N. Y...	April 3, "
Steam engines, rotary, valves of..	James P. Ross	Lewisburg, Pa......	July 31, "
Steam engines, arrangement of the lever half beam of.............	William A. Lighthall ...	Albany, N. Y......	Oct. 23, "
Valve, piston, enclosed in the steam cylinder..................	Isaac L. Bennett.......	Westerlow, N. Y...	Feb. 6, "
Valves, short slide, by chamfering the corners	James Mulbury........	Parkesburg, Pa....	Feb. 20, "

* In England, March 10, 1847.

† In England, January 4, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Valves, cut-off and working the, of steam engines	George H. Corliss......	Providence, R. I....	Mar. 10, 1849
Valve sliding cut-off.............	Simon P. Winne........	Albany, N. Y......	Ap'l 10, "
Valve, foot, of steam engines......	S. W. Rogers...........	Baltimore, Md.....	Oct. 2, "
Valve, blow-off, of steam boilers, method of regulating the.......	Charles W. Copeland...	Brooklyn, N. Y....	Nov. 27, "

CLASS VII.—NAVIGATION AND MARITIME IMPLEMENTS, *comprising all Vessels for Conveyance on Water, their Construction, Rigging and Propulsion, Diving Dresses and Life Preservers.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bells, fog, method of ringing, and an adjustable clapper for the same*	Daniel Jones, Jr........	St. Johns, N. B.....	Nov. 22, 1849
Boats, canal, or sections thereof, revolving cradle for unloading—see class IX., "Cradle," &c.			
Boats, flexible, divisions between the tubes of....................	Eben T. Starr	New York, N. Y....	Ap'l 17, "
Boat, life, self-inflating and folding.	Wm. and Thos. Schnebly	Hagerstown, Md...	Jan. 23, "
Boat, life, revers ble	George P. Tewksbury ..	Boston, Mass.......	Aug. 7, "
Boats, life, form of the air chambers of.........................	James D. Greene.......	Cambridge, Mass...	Sep. 25, "
Capstan, variable power..........	Joseph E. Andrews, assignor to Edwin Allyn.	Boston, Mass.......	Ap'l 24, "
Centre board, folding............	John M. Hoffman	Buffalo, N. Y......	Ap'l 10, "
Centre board, keel................	Thomas Maskell	Franklin, La.......	Oct. 9, "
Diving bells, deep sea..........	J. Avery Richards and John W. Wolcott.....	Boston, Mass.......	Ap'l 3, "
Diving bells.....................	J. Rutherford Worster..	Baltimore, Md......	Ap'l 24, "
Hammock—see "life preserving," &c.			
Life preserving hammock, arrangement of the sections in a.......	Samuel J. Seely........	New York, N. Y....	July 10, "
Propellers......................	John Patch.............	Boston, Mass.......	Nov. 27, "
Propellers, journals for osc llating.	Matthew A. Crooker ...	New York, N. Y....	Oct. 16, "
Propellers, reciprocating.........	Henry W. Hewet......	New York, N. Y....	Oct. 9, "
Propeller, sculling...............	Alexander Bond........	Philadelphia, Pa....	June 19, "
Propelling vessels by reaction.....	Morris W. Ruthven	New York, N. Y....	May 22, "
Rope machinery—see class III.			
Saddle and winch, combination of adjustable......................	Abraham G. Polhameus.	Nyack, N. Y.......	Mar. 27, "
Sails, means for working..........	William A. Ross.......	P. Richmond, N. Y.	Oct. 30, "
Shank painter stopper...........	Chas. Perley and Joshua Terry.................	New York, N. Y....	June 5, "
Steam boat, canal................	Granville Parker.......	Worcester, Mass...	Mar. 27, "
Steering apparatus	Jesse Reed	Marshfield, Mass...	June 5, "
Treenail machines...............	Josiah Kirby...........	Cincinnati, O.......	Aug. 21, "
Treenails, machinery for dressing.	Jesse Fitzgerald........	New York, N. Y....	Aug. 28, "
Vessels, blocks for supporting bilges and keels of	Francis Grice..........	Washington, D. C...	Feb. 20, "
Vessels, machine for paying seams of	Samuel Baker..........	Portsmouth, N. H..	Ap'l 3, "
Vessels, method of lifting over shoals........................	Abraham Lincoln......	Springfield, Ill......	May 22, "

* In Canada, Aug. 22, 1849.

CLASS VIII.—MATHEMATICAL, PHILOSOPHICAL AND OPTICAL INSTRUMENTS, *including Clocks, Chronometers, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Calculating machines	William M. Haines	Rochester, N. Y	May 1, 1849
Calculating machines	Samuel S. Young	Eaton, Ohio	July 24, "
Callipers, transverse	William J. Van Ness	Baltimore, Md	Oct. 30, "
Chronometers for longitude	John Sheldon	Millville, N. J	Nov. 20, "
Galvanic batteries	Adolphus Olmstead	Easton, Pa	Ap'l 17, "
Parallactic instruments for measuring distances	William Wurdemann	Washington, D. C	Sep. 11, "
Planetariums	Benjamin O. Swain	Annisquam, Mass	Aug. 31, "
Spectacle frames	Jacob Shaw, Jr	Hinckley, Ohio	April 3, "
Spectacle frames	Joseph J. Low	Philadelphia, Pa	Ap'l 17, "
Spectacle glasses	David Hotchkiss and B. R. Norton	Syracuse, N. Y	Ap'l 17, "
Sun dials	James Scott	Portland, Me	June 5, "
Telegraphs, electric *	Alexander Bain	London, England	Ap'l 17, "
Telegraphs, electric	Samuel F. B. Morse	Poughkeepsie, N. Y.	May 1, "
Telegraphs, electro-chemical	Robert Smith and Alex. Bain	Blackford, Scotland. Hammersmith, Eng.	Oct. 30, "
Telegraphs, indicating	Lucius G. Curtiss	Cincinnati, O	Jan. 16, "
Telegraphs, magnetic	Caleb Winegar	Springfield, N. Y	Mar. 20, "
Telegraph wires, supporters for	L. R. Livingston, J. J. Roggen, Calvin Adams, Amos Kendall and Alfred Vail	Pittsburgh, Pa Washington, D. C	Oct. 9, "
Time-pieces, mode of applying springs in	Levi Beach	Bristol, Conn	Sep. 25, "

* In England, December 12, 1846.

CLASS IX.—CIVIL ENGINEERING AND ARCHITECTURE, *comprising Works on Rail and Common Roads, Bridges, Canals, Wharves, Docks, Rivers, Wiers, Dams, and other Internal Improvements, Buildings, Roofs, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Auger for boring earth	Ashley Crafts and Ebenezer Weeks	Auburn, Ohio	Nov. 20, 1849
Bog-cutters—see class I.			
Borer and elevator, earth	Phinehas Dow	Philadelphia, Pa	Dec. 25, "
Bridges, elliptical or oval truss frame for	James Barnes	Springfield, Mass	Mar. 27, "
Bridges, method of attaching the arch to the truss frame in	J. Dutton Steele	Pottstown, Pa	Feb. 20, "
Bridge, swinging	Joseph Ross	Ipswich, Mass	Jan. 2, "
Cradle, revolving, for unloading canal boats or sections thereof	John Elgar and Benjamin Hallowell	Baltimore, Md Alexandria, Va	Ap'l 10, "
Dam or water wier, adjustable	Milow S. Wheaton	Riga, N. Y	April 3, "
Doors, double hinged water guard for	John Burt	Tiverton, R. I	April 3, "
Dredging machines, method of directing the scoops in	James Callaghan	New Bedford, Mass.	Jan. 16, "
Drilling machine, combined spring rock	Samuel Jack, 2d	Richmond, Me	Jan. 30, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Drilling machines, rock, method of turning the drill in	Jesse N. Bolles & Henry G. Knights	Providence, R. I. Boston, Mass	May 1, 1849
Drilling machines, combined construction and operation of the drill in	George N. Doan	Millerstown, Pa	Aug. 28, "
Drilling rocks, machinery for	Joseph J. Couch	N. Bridgewat'r, Mass	Mar. 27, "
Drilling sub-marine rock, apparatus for	Thomas Kendall	New York, N. Y	Ap'l 17, "
Fences	Lucius Leavenworth	Trumansburg, N. Y.	Oct. 30, "
Fences, flood	Henry Reichert	Shippensburg, Pa	Feb. 27, "
Fences, flood	John Sourbeer	Mount Joy t'p, Pa	Jan. 30, "
Fences, wire	Henry Jenkins	Pottsville, Pa	Feb. 13, "
Frog for railroads	John W. Hoffman, assignor to Henry A. Landry	Philadelphia, Pa. Camden, N. J	Dec. 4, "
Gates	Lorenzo Smith	Easton, Mass	May 29, "
Gates, arrangement of weight and pulley for closing	Willard Twitchell	Syracuse, N. Y	Aug. 7, "
Gates, flood, for fences	Stephen D. Hopkins	Brooksville, Va	Nov. 20, "
Gates, folding	Isaac Meritt	N.W.Bridgew'r, Mas	Dec. 18, "
Gates, railroad, machinery for operating by means of the locomotive	Richard Coffin	W. Haverhill, Mass.	June 5, "
Privies signal for	J. H. Doughty	New York, N. Y	Sep. 18, "
Railroads, rails and wheels for turning curves of	J. F. B. Flagg	Philadelphia, Pa	Jan. 23, "
Railroads, apparatus for removing animals from	Louis Montgilion	Elk Ridge Landg, Md	Feb. 13, "
Railroad bar, combined	Alfred B. Seymour	Bordentown, N. J	Mar. 13, "
Railroad switch, self-adjusting	Erastus C. Matthewson	Hartford, Conn	Mar. 20, "
Railroad switches, method of fastening	Francis G. Woodward	Worcester, Mass	Ap'l 24, "
Railroad switch, self-acting	Lucius B. Woods	Bradford, N. H	May 8, "
Railroad turn out	Carlton Dutton	Rochester, N. Y	June 5, "
Railroad track, lever to be placed on a, and acted upon by the wheels of cars or locomotives	John W. Hoffman, assignor to Lewis B. Kelly and Benj. Harper	Philadelphia, Pa	June 19, "
Rail, two part, tubular	John Elgar	Baltimore, Md	Mar. 10, "
Railway chairs, machine for bending the lips of wrought iron	Samuel A. Cox, assignor to Matthew P. Sawyer and John W. Hall	Malden, Mass. Boston, Mass	Aug. 28, "
Railway switches, method of operating	William C. Hicks	Rutland, Vt	May 8, "
Road-scrapers	Benjamin M. Townsend	Quincy, Ill	Aug. 14, "
Scraper, double revolving	Ashley Crafts and Ebenezer Weeks	Auburn, Ohio	Dec. 4, "
Stairs, construction of iron	Benjamin F. Miller	New York, N. Y	Oct. 23, "
Street sweeping machines	C. S. Bishop	Easton, Pa	Sept. 4, "
Telegraph wires, painting	Benjamin H. Green	Princeton, N. J	Jan. 9, "
Telegraph wires, suspending	Abijah Pratt and Raymond Graverend	New York, N. Y	Feb. 27, "
Waste-gate or sluice, self-acting	Ambrose Torrey	Boston, N. Y	Oct. 2, "
Weather strip	Ebenezer Garnsey	Watertown, Conn	Oct. 30, "
Weather strip, roller	Hiram C. Brown	Xenia, Ohio	Jan. 30, "

CLASS X.—LAND CONVEYANCE, *comprising Carriages, Cars, and other Vehicles used on Roads, and parts thereof.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Axles of carriages	John J. Flack	Joliet, Ill.	Sep. 4, 1849
Axles, grease boxes for	John M. Smart	New York, N. Y.	Nov. 6, "
Boxes for railroad cars	Robert Levington	Monroe, Mich.	Ap'l 17, "
Brakes for cars	William Stinehart and John Taggart	Charlestown, Mass.	Feb. 27, "
Brakes for cars, mode of operating	Nehemiah Hodge	Adams, Mass.	Oct. 2, "
Brakes for carriages	Gideon Griest	Adams co., Pa.	June 5, "
Brakes, carriage	Amos B. McFarlan	Downingtown, Pa.	Ap'l 17, "
Brakes for railroad cars	Leverett Treadwell	New York, N. Y.	Ap'l 3, "
Brakes for railroad cars	Horace T. Robbins	Lowell, Mass.	Sep. 4, "
Carriage bodies, hanging	Israel Jackson	West Grove, Pa.	Mar. 20, "
Carriages, railway, annunciators for	Mason H. Ford	Boston, Mass.	May 8, "
Cars, couplings for	Joseph D. Alvord	Springfield, Mass.	Sep. 18, "
Cars, couplings for	H. L. B. Lewis	New York, N. Y.	Sep. 18, "
Cars, couplings for	Warren D. Hatch	Worcester, Mass.	Oct. 2, "
Car couplings, self-acting	Albert G. Safford	Boston, Mass.	Dec. 11, "
Cars, dumping	Alpheus Nettleton	Springfield, Mass.	Jan. 30, "
Cars, for dumping earth, &c.	Michael Berney	Syracuse, N. Y.	Sep. 11, "
Cars, railroad, seats for	Amos W. Snow, assignor to James D. Mowry & P. L. Hyde	Norwich, Conn.	June 26, "
Felloes, machines for cutting out	Joseph and Levi Adams, and Luther H. Moore	Hadley, Mass. Leverett, Mass.	June 12, "
Hubs and axles, attaching and detaching	R. D. Munson	Williston, Vt.	Jan. 2, "
Hubs and axles, connecting	Charles Chinnock	New York, N. Y.	Jan. 9, "
Hubs and axles, manufacture of	Stephen R. Hunter and Mead Merrill	Cortlandville, N. Y.	Feb. 27, "
Hubs, connecting with axles	Junius Foster	Bridgeport, Conn.	July 24, "
Hubs, connecting to axles	John Kellogg	Madison, Ohio	Nov. 13, "
Hubs, connecting with axles	Elnathan Sampson and A. M. Billings	Claremont, N. H.	Nov. 20, "
Hubs, machinery for preparing for boxes	Isaac Munden	Alleghany city, Pa.	Dec. 11, "
Journals and boxes	Thos. Hopper and Thos. Garrison	N. Brunswick, N. J.	Jan. 2, "
Railway propeller	Robert G. and Oliver P. Hatfield	New York, N. Y.	Ap'l 17, "
Springs, carriage	Hiram T. Hyde	Troy, N. Y.	Ap'l 3, "
Springs, caoutchouc	Fowler M. Ray	New York, N. Y.	Mar. 27, "
Springs for carriages, &c.	Daniel R. Pratt	Worcester, Mass.	Mar. 20, "
Springs for carriages	William S. Thomas	Norwich, N. Y.	Oct. 30, "
Tires, iron wheel, machinery for making	Thomas W. Allen and Charles W. Noyes	Greenbush, N. Y.	Ap'l 3, "
Trucks, railroad	Jacob G. Day	Brooklyn, N. Y.	Jan. 30, "
Trucks for railroad cars	Isaac Knight	Baltimore, Md.	June 12, "
Trucks, railroad	John F. Rogers	Troy, N. Y.	Nov. 27, "
Trucks, railroad	J. W. Moyer	Utica, N. Y.	Dec. 25, "
Wagons, dumping	William H. Start	Smyrna, Del.	Feb. 6, "
Wheels, car, manufacture of	Edward Finch	Liverpool, England	Aug. 21, "
Wheels, car, method of regulating the contraction of	John Murphy	Kensington, Pa.	Aug. 7, "
Wheels, cast iron car	Linus Dean and A. Higham	Utica, N. Y.	Jan. 9, "
Wheels, cast iron car	William B. Treadwell	Albany, N. Y.	Jan. 9, "
Wheels, cast iron car	James M. Cook	Taunton, Mass.	Jan. 9, "
Wheels, cast iron car	Edward B. Baker	Parishes of St. Philips and St. Michael, S. C.	Jan. 9, "
Wheels, cast iron car	A. T. Converse and Wm. S. Cooley	Norwich, Conn.	Jan. 9, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Wheels, cast iron car	Samuel Truscott	Columbia, Pa.	Jan. 16, 1849
Wheels, cast iron plate car	Horace Felton, Perley D. Cummings and Harington Hinckly	Portland, Me.	Jan. 23, "
Wheels, cast iron car	Carmi Hart and Nathan Washburn	Rochester, N. Y.	Ap'l 3, "
Wheels, cast iron car	Isaac Van Kuran	Rochester, N. Y.	May 1, "
Wheels, cast iron car	Thomas S. Bourshett	Little Falls, N. Y.	Nov. 13, "
Wheels, cast iron car	Hiram H. Wiser	Rochester, N. Y.	Dec. 4, "
Wheels, cast iron car	Carmi Hart	New York, N. Y.	Dec. 25, "
Wheels for carriages	Isaac B. Ward	Camden, N. J.	Dec. 25, "
Whiffletree hook	A. N. Gray	Cleveland, O.	July 24, "

CLASS XI.—HYDRAULICS AND PNEUMATICS, *including Water-wheels, Wind-mills, and other implements operated on by Air or Water, or employed in raising and delivering Fluids.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Barrel carriages	William Furley	Smithsburg, Md.	Oct. 30, 1849
Bellows	William T. Barnes	Buffalo, N. Y.	Ap'l 24, "
Blast generators	Charles C. Lloyd	Philadelphia, Pa.	Ap'l 17, "
Cocks, stop, for hot water and steam	John Sheriff	Pittsburg, Pa.	Jan. 16, "
Cocks, stop, and filters in combination	A. and H. Johnson	New York, N. Y.	Nov. 27, "
Current wheels, apparatus for	James Secor	St. Louis, Mo.	Feb. 20, "
Engine, air *	Francis Jos. Laubereau	Paris, France	Ap'l 10, "
Engines, fire	John B. Tarr	Albany, N. Y.	Nov. 6, "
Filtering diaphragm, self-regulating	William H. Jennison	New York, N. Y.	May 1, "
Fluid metre—see class VI.			
Forebays, regulating	Henry Mallow	Upper Tract, Va.	Mar. 13, "
Pipes, lugs and links for connecting	Chapman Warner	Louisville, Ky.	May 8, "
Pumps	George W. Fulton	Baltimore, Md.	May 29, "
Pumps	Birdsill Holly, assign'r to Abel Downs, E. Mynderse, Horace C. Silsby and Washburn Race	Seneca Falls, N. Y.	June 5, "
Pumps for raising water	John B. Read	Tuscaloosa, Ala.	Sept. 11, "
Pumps for raising water	Alexander Stiven	New York, N. Y.	Dec. 4, "
Pump pistons, packing	Edwin A. Jeffery	Corning, N. Y.	Dec. 11, "
Pumps, rotary	Peter Sweeney	Buffalo, N. Y.	Nov 27, "
Pumps, rotary, packing for	Albigence W. Cary	Brockport, N. Y.	May 15, "
Pump valves and their arrangement	Thomas Thacher	Wilkesbarre, Pa.	July 17, "
Ram, water	Alpheus D. Smith	Meredith, N. Y.	Ap'l 17, "
Rams, water †	Joshua L. Gatchel	Elkton, Md.	Ap'l 17, "
Tube, combined lap & butt welded	James McCarty	Reading, Pa.	Dec. 18, "
Valve, self-adjusting for regulating the admission of air to fan blowers	Frederick S. Barnard	Zanesville, Ohio	Oct. 23, "
Water, apparatus for raising	William T. Barnes	Buffalo, N. Y.	Mar. 20, "
Water, apparatus for drawing from wells	Jehial T. Farrand	Port Byron, N. Y.	Mar. 20, "
Water, &c., apparatus for filtering	Justin Mulhern	St. Louis, Mo.	July 31, "
Water, apparatus for raising and carrying	James D. Willoughby	Scotland, Pa.	Nov. 6, "
Water, apparatus for drawing from wells	Harvey W. Sabin	Reed's Corners, N. Y.	Dec. 11, "

* In France, October 30, 1847.

† Antedated April 10, 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Water-buckets, apparatus for raising and tilting	Harvey W. Sabin and Luther B. Benton	Reed's Corners, N.Y. Penn Yan, N. Y.	Mar. 13, 1849
Water, machinery for raising from wells	Jehial T. Farrand and William Hinman	Port Byron, N. Y.	Oct. 2, "
Water mains, valve-seats, &c., for	Theodore R. Scowden	Cincinnati, Ohio	May 1, "
Water, raising and conveying	John J. and Sam'l P. Cox	Shippensburg, Pa.	April 3, "
Water-wheels	James Trees	Salem township, Pa.	Feb. 13, "
Water-wheels, tide	Freeman F. Myrick	Lynn, Mass.	Mar. 20, "
Water-wheels, re-action	Jesper Smith	Mansfield, N. J.	April 3, "
Water-wheels	William G. Masterson	Amesbury, Mass.	Oct. 9, "
Water-wheels, &c., regulators for—see class XIII., "Regulators," &c.			
Wind-mills	Charles B. Hutchinson	Waterloo, N. Y.	June 5, "
Wind-mills	Emory and Emerson Gore	Charleston, Iowa	July 3, "

CLASS XII.—LEVER, SCREW, *and other Mechanical Power as applied to Pressing, Weighing, Raising, and Moving Weights.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Balances, double scale	Thaddeus Fairbanks	St. Johnsbury, Vt.	Mar. 13, 1849
Balances for weighing	Robert Eastman, assignor to Maria L. Eastman	Concord, N. H.	Mar. 13, "
Balances, pendulum	Elnathan Sampson	Claremont, N. H.	Nov. 6, "
Boom derrick	George E. Warner	Springfield, Mass.	June 5, "
Can-hooks	George Webber	Portland, Me.	Sep. 11, "
Hoisting apparatus	Elijah Learned	Boston, Mass.	Feb. 6, "
Packers, flour	Nathan Kinman	Buffalo, N. Y.	Oct. 30, "
Presses	David McComb	Port Gibson, Miss.	Feb. 27, "
Press, centripetal	James E. Serrell and David Smith	New York, N. Y.	July 3, "
Presses, cheese	Lansing Kellogg	Ravenna, O.	Feb. 6, "
Presses, cheese, self-acting	Almeron McKinney and David Tyler	Clarksfield, O.	Feb. 13, "
Presses, cheese, self-acting	Benjamin H. Otis	Cleveland, O.	Mar. 27, "
Presses, cheese, self-acting	Ira Carter, Jr.	Plattsburg, N. Y.	Aug. 14, "
Presses, cheese, self-acting	Samuel Mann	Alstead, N. H.	Sep. 25, "
Presses, cotton	Thomas Ashcraft	Randolph co., Ala.	Mar. 6, "
Presses, cotton	William J. Johnson	Mobile, Ala.	Mar. 13, "
Presses for cotton, &c., hydraulic	Charles Wilson	Williamsburg, N. Y.	Oct. 9, "
Raising bricks, mortar, &c., extension machines for	James Cox, assignor to Jacob and Jno. Pringle	Ebensburg, Pa.	June 5, "
Scale, lever, for canals, railroads, &c.	Ely Ellicott and Samuel A. Abbott	Philadelphia, Pa.	Feb. 6, "
Scales, platform	Thaddeus Fairbanks	St. Johnsbury, Vt.	Nov. 20, "
Steelyards for weighing	Tilly Flint and Warren Flint	Westford, Mass. Chelmsford, Mass.	Mar. 20, "
Unloading carts, &c., apparatus for	Charles Downer	Philadelphia, Pa.	July 24, "
Winch, direct and counter motion	Charles Perley	New York, N. Y.	May 29, "
Windlasses, method of fitting the heaving socket and head of	Charles Perley	New York, N. Y.	Nov. 13, "

CLASS XIII.—GRINDING MILLS AND MILL-GEARING, *including Grain Mills, Mechanical Movements and Horse-Powers.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Belts, rope, forks for holding upon drum wheels	Charles Foster	Pompey, N. Y.	Ap'l 24, 1849
Bolts, flour	George W. Brown	Jackson, Mich.	Nov. 27, "
Bran-dusters	Robert M. Dempsey	Indianapolis, Ind.	Dec. 18, "
Corn-shellers	Johnston Small	Bridgewater, Pa.	Mar. 27, "
Corn-shellers	Israel J. Richardson	New York, N. Y.	April 2, "
Corn-shellers	Israel Kepler	Milton, Pa.	Ap'l 24, "
Corn-shellers	David O. Prouty and Ezra Whitman	Philadelphia, Pa. Baltimore, Md.	May 29, "
Corn-shellers	Jacob Mumma	Middletown, Pa.	June 12, "
Corn-shellers	D. W. Harris and E. P. Carter, assignors to Carter, Harris & Carter	Yorkshire, N. Y.	Nov. 6, "
Flour, machinery for separating from bran	Issachar Frost and James Monroe	Albion, Mich.	Feb. 27, "
Flour, machinery for separating from bran, &c.	Edwin and Jas. M. Clark	Lancaster, Pa.	Ap'l 17, "
Flour, machinery for separating from bran	Joseph Johnston	Wilmington, Del.	Ap'l 17, "
Flour, machinery for dressing	Charles Learned and Stephen Hughes	Indianapolis, Ind.	Nov. 27, "
Flouring, process of	David P. Bonnell	Tecumseh, Mich.	Aug. 14, "
Gear, bevelled, machine for cutting teeth of	George H. Corliss	Providence, R. I.	Mar. 10, "
Gearing	Benjamin Arnold	E. Greenwich, R. I.	Oct. 30, "
Horse powers	William Ward	Zanesville, O.	Sep. 11, "
Horse powers, construction of the master-wheel of	John A. Taplin	Fishkill, N. Y.	June 12, "
Horse powers, equalizing the action of gearing in	Charles Caples	Savannah, Mo.	July 31, "
Mill-bushes	Hazard Knowles	Washington, D. C.	Jan. 16, "
Mills for grinding	Thomas A. Chandler	Rockford, Ill.	July 10, "
Mills for grinding	Lewis Fagin	Cincinnati, Ohio	Oct. 30, "
Mills for grinding	David Marsh and Eli B. Nichols	Fairfield, Conn.	Oct. 30, "
Mills for grinding	Samuel W. Powell	Tuscarora Valley, Pa	Dec. 4, "
Mills, hanging shafts in	Edward Bancroft	Philadelphia, Pa.	Oct. 9, "
Mill-shafting	Edward Bancroft	Philadelphia, Pa.	May 22, "
Mill-stones, forming and balancing	Edmund Munson	Utica, N. Y.	Aug. 7, "
Pawls, jointed	Samuel S. Walley	Philadelphia, Pa.	Sep. 11, "
Pulleys, binder, for belts and brakes	Mertoun C. Bryant	Lowell, Mass.	Nov. 13, "
Regulators	J. F. Mascher	Philadelphia, Pa.	Nov. 6, "
Regulators for water-wheels, &c.	James Finlay	Cold Spring, N. Y.	Nov. 13, "
Smut machines	Joseph Heygel	Cumberland, Md.	June 5, "
Smut machines	Albert Buell and Thomas Brown	Lowville, N. Y.	July 17, "

CLASS XIV.—LUMBER, *including Machines and Tools for Preparing and Manufacturing; such as Sawing, Planing, and Mortising, Shingle and Stave, Carpenters' and Coopers' Implements.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Auger, combin'd convex & concave	Nathaniel C. Sanford	Meriden, Conn.	Mar. 27, 1849
Augers, screw, machine for regulating the twist and diameter of	Nathaniel C. Sanford and Lucius B. Smith	Meriden, Conn.	Ap'l 10, "
Auger-stock	William T. Barnes	Buffalo, N. Y.	April 3, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Barrel-carriages—see class XI.			
Barrel-heads, machinery for dressing	Timothy Shepard	Oswegatchie, N. Y.	Nov. 27, 1849
Barrel machinery	Reuben Murdock	Rochester, N. Y.	June 12, "
Boring machines	James H. Aldrich	Portsmouth, N. H.	Nov. 27, "
Boring machines	William H. Wilcox	Tarrytown, N. Y.	May 29, "
Boring and mortising machines	Chandler Carter	Manchester, Mich.	May 22, "
Boring window sash, machinery for	John Wiley	New Orleans, La.	Dec. 25, "
Boxes, machinery for making	Wilbur M. Davis	Gardiner, Me.	Jan. 16, "
Carving machines	Hezekiah Auger	New Haven, Conn.	Jan. 23, "
Carving wood or metal, machine for	Isaac M. Singer	Pittsburg, Pa.	Ap'l 10, "
Chucks	James W. Martin and Edwin Parry	Philadelphia, Pa.	Aug. 28, "
Clapboard machines	Bliss Corser	Mt. Morris, N. Y.	Jan. 16, "
File cutting machines—see class II.			
File supporter	Jerome B. Woodruff and Benjamin M. Townsend	Washington, D. C. Quincy, Ill.	Nov. 6, "
Hoops, cheese, &c., machines for cutting and slitting	Patrick Bryant, assignor to Elkanah Ring, Jr., and Thomas Ring	Chesterfield, Mass. Worthington, Mass.	May 15, "
Lathes, chucks for	William Grant	Boston, Mass.	Jan. 23, "
Lathes for turning	Allen Goodman & Hammond Doane	Dana, Mass.	Nov. 6, "
Lathes, varying the speed of the mandril in	William A. Chapin, Jr.	St. Johnsbury, Vt.	Oct. 2, "
Lumber, machinery for working into irregular forms	Rufus Powers	Prescott, Mass.	May 8, "
Mortising machines	Hezekiah B. Smith	Manchester, N. H.	Ap'l 17, "
Mortising machines	John J. Weeks	Buckram, N. Y.	Ap'l 17, "
Planes, bench	Charles S. Beardsley and Simeon Wood	Auburn, N. Y. New York, N. Y.	May 22, "
Planes, for bevel edges	William H. Blye	De Ruyter, N. Y.	Ap'l 10, "
Plane irons, adjusting the position of, and regulating the throats of planes	Emanuel W. Carpenter	Lancaster, Pa.	Mar. 27, "
Planing machines	Dan'l Barnum and Thos. J. Wells—Wells assignor to Barnum	New York, N. Y.	Mar. 13, "
Planing machines	Thos. J. Wells, assignor to Daniel Barnum	New York, N. Y.	Mar. 20, "
Planing machines.*	Joseph P. Woodbury	Boston, Mass.	Mar. 20, "
Planing machines	Charles A. Spring and William H. Derick	Kensington, Pa.	April 3, "
Planing machines	Hazard Knowles, assig'r to John Levy	Washington, D. C. New York, N. Y.	Ap'l 10, "
Planing machines	Hervey Law	Wilmington, N. C.	Ap'l 10, "
Planing machines	Job Sheldon and John S. Barden	New Haven, Ct.	Ap'l 17, "
Planing machines	Enos G. Allen	Boston, Mass.	Ap'l 17, "
Planing machines	Enos G. Allen	Boston, Mass.	Oct. 23, "
Planing machines	Charles H. Peck and Coleman Hicks	St. Louis, Mo.	Ap'l 24, "
Planing machines	Reid R. Throckmorton	Brooklyn, N. Y.	Aug. 28, "
Planing machines	Hugh Jeter, assignor to Jeter and Watson	Lexington, Ky.	Oct. 30, "
Saws	Ebenezer Clark	Rushville, Ill.	April 3, "
Saws, circular, machine for filing	Israel F. Brown	Columbus, Ga.	Oct. 2, "
Saws, machine for filing	Presbery Norton and F. D. Cottle	Tisbury, Mass.	Jan. 9, "
Saw mills	Lemuel Hedge	New York, N. Y.	May 8, "
Saw mills, curvilinear	Thomas Dugard	New York, N. Y.	Nov. 20, "
Saw mills, circular	David Phillips	Pittsburg, Pa.	July 3, "

* Antedated September 20, 1848.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Saw mills, with cylindrical saws	Gilbert Hatheway	Rochester, Mass.	Ap'l 24, 1849
Saw-set, circular	Elhanan W. Scott	Lowell, Mass.	Oct. 23, "
Saw-set, nipper	Jacob Muzzy	Eddington, Me.	Feb. 13, "
Sawing, mitre, machinery for	Dennis S. Stow	Cohoes, N. Y.	Oct. 2, "
Sawing ship timber, &c., mills for	John W. Cochran	Citizen of the United States, residing in London, Eng.	Aug. 21, "
Sawing wood, machinery for	Joseph M. Toy, assignor to David Bonner	Greenfield, O.	Ap'l 24, "
Shingle machines, feed apparatus for	Henry Burt	Cohoes, N. Y.	Oct. 30, "
Shingles, machinery for dressing	Lewis Stockwell	Sutton, Mass.	Ap'l 10, "
Shingles, machinery for dressing	Franklin Jenney	New Bedford, Mass.	Sep. 18, "
Shingles, machinery for riving and dressing	Enoch R. Morrison	Angelica, N. Y.	Sep. 18, "
Shingle and stave dressing machines	Elisha Luter	Robertson co., Tenn.	Jan. 23, "
Squares, carpenters', machine for making	Jeremiah Essex	Bennington, Vt.	Ap'l 17, "
Squares, carpenters', graduating	Dennis J. George and Norman Millington	Shaftsbury, Vt.	Aug. 28, "
Staves, machinery for dressing	George Gilbert	New Haven, Ct.	Ap'l 17, "
Staves, machinery for jointing and cutting	Charles Mowry	Eldridge, N. Y.	May 1, "
Staves, machinery for dressing	Hervey Law	Wilmington, N. C.	May 8, "
Staves, machines for jointing	William H. Seymour	Stockton, N. Y.	May 22, "
Staves, machinery for jointing	Lewis S. Chichester	Troy, N. Y.	July 3, "
Staves, machinery for jointing	Samuel Jobes	Moundsville, Va.	Aug. 28, "
Staves, machinery for jointing	Hosea and Lorenzo D. Benson	Jackson, Pa.	Sep. 25, "
Staves, machinery for jointing	David Vaughan	Remsen, N. Y.	Dec. 11, "
Staves, machinery for dressing	Asa Broad	Louisville, Ky.	Dec. 18, "
Stops for carpenters' becnhes	Lebbeus Augur and Jas. L. Lord	Chester, Conn.	May 29, "
Tonguing and grooving, cutters for	Hazard Knowles, assig'r to John Levy	Washington, D. C. New York, N. Y.	Ap'l 17, "
Tools, machine for grinding and polishing	Joseph Vaughan, Jr.	Union, Me.	Dec. 11, "
Turning	Arunah S. Macomber	Bennington, Vt.	Jan. 2, "
Turning irregular forms, machinery for	James M. Eddy, assignor to John Kimball	Boston, Mass.	Feb. 20, "
Turning right and left lasts, &c., from the same pattern, machinery for—see class XVI., "Lasts," &c.			
Turning lasts, &c., macninery for, see class XVI., "Lasts," &c.			
Veneers, &c., machinery for cutting	E. B. Cherevoy	New York, N. Y.	Ap'l 17, "
Veneers, machines for cutting from cylindrical blocks	Benjamin S. Stedman	Warren, Mass.	July 3, "
Veneers, manufacture of paper	Chas. Walker and Geo. Willson	Chester, Vt. Weathersfield, Vt.	Mar. 20, "
Veneering, cauls for	Hazard Knowles	Washington, D. C.	Sep. 25, "
Wood, bending	Thomas Blanchard	Boston, Mass.	Dec. 18, "

CLASS XV.—STONE AND CLAY MANUFACTURES, *including Machines for Pottery, Glass making, Brick making, Dressing and Preparing Stone, Cements, and other Building Materials.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bricks, coloring	Cyrus B. Doty	Cortland, N. Y.	Feb. 6, 1849
Brick, machines for moulding	John W. Frost	Croton, N. Y	Nov. 20, "
Bricks, mortar, &c., extension machines for raising—see class XII., "Raising," &c.			
Brick presses	Valentine Roth	Evansville, Ind	Feb. 20, "
Brick presses	Nathaniel Adams	Canterbury, N. Y	Ap'l 17, "
Brick presses	William B. Waldran and Godfrey Hargitt	Shelby co., Tenn.	July 10, "
Brick presses	Ferdinand Zisemann	St. Louis, Mo.	Nov. 13, "
Brick presses	Arad Woodworth, 3d, & Samuel Mower	Worcester, Mass. Philadelphia, Pa.	Nov. 27, "
Brick presses	John T. Brown and M. Fuller	Midville, Ga.	Dec. 11, "
Glass pipes, moulds for making	George Scott, assignor to D. O. Ketchum	Albany, N. Y.	Sep. 4, "
Grindstones, machines for making	Cotton Foss	Painesville, Ohio	Ap'l 24, "
Marble, imitation of	Samuel W. Davis	Cincinnati, Ohio	May 22, "
Pottery ware, glazing	C. W. Fenton	Bennington, Vt.	Nov. 27, "
Stone dressing machines	William Eayrs	Concord, N. H	Dec. 4, "
Stone, machines for dressing	Charles Wilson	Springfield, Mass.	Ap'l 10, "
Stone, machines for polishing	George Fletcher, Sr	Greensburg, Ind	Ap'l 24, "

CLASS XVI.—LEATHER, *including Tanning and Dressing, Manufacture of Boots, Shoes, Saddlery and Harness.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Awl haft	Dexter H. Chamberlain, assignor to William A. Dodge	Boston, Mass. W. Cambridge, Mass	Ap'l 3, 1849
Bark, mills for grinding	Sidney A. Bantz and William Andrew	Frederick, Md.	Dec. 4, "
Boot crimps	Sardius Pasco and Elihu Perry	Cato, N. Y	Ap'l 3, "
Boot crimps	Eli R. Horner and Wm. Holland	Fayetteville, Pa	Oct. 2, "
Boot crimps	Benjamin Livermore	Hartland, Vt	Oct. 16, "
Boot heels, cutting	Philander Shaw	Abington, Mass	Feb. 6, "
Boot heels, metallic	P. S. Devlan, assignor to G. S. Langdon	Reading, Pa. Rising Sun, Md	July 24, "
Boots, machines for cutting gaiter	William Snell	Easton, Pa	Ap'l 10, "
Boots and shoes, spring shanks for	John McGinley	Philadelphia, Pa	Mar. 13, "
Boots and shoes, machinery for cutting soles of	Abram D. Boynton	Haverhill, Mass	May 8, "
Boots and shoes, machines for pegging	James La Dow	Granville, O.	July 31, "
Boot trees	Henry Wright	New Castle, Me	Jan. 16, "
Buckles for harness	Hiram Todd	Columbus, O.	May 22, "
Buckle tongues, detachable	Alvah Worster	Hannibal, N. Y	Dec. 4, "
Cockeyes for harness	Joseph W. Briggs, assig'r to Fowler P. Taylor	Cleveland, O.	June 5, "
Hames	Joseph W. Briggs	Cleveland, O.	May 22, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Hames, apparatus for bending	Abel Gardner	Buffalo, N. Y	Dec. 11, 1849
Hames, harness	Charles Pope	Syracuse, N. Y	Nov. 6, "
Harness adapted to horse rakes—see class I., "Rakes," &c.			
Hides, machines for breaking	Isaac S. Hershey	Hagerstown, Md.	Sep. 11, "
Horse collars, machines to manufacture	William Criswell	Butler, Pa.	Oct. 16, "
Lasts, &c., machinery for turning right and left from the same pattern	Samuel Huntington	Middlefield, N. Y.	Feb. 20, "
Lasts, &c., machinery for turning	Elbridge Webber and C. Hartshorn	Gardiner, Me.	Ap'l 3, "
Lasts, machinery for turning right and left	Charles Hartshorne and William B. Shaw	Gardiner, Me.	Nov. 13, "
Lasts, shoe	John Whistler	Carlisle, Pa	Ap'l 24, "
Leather dressing machines	Charles Slawson	Norwich, N. Y	Nov. 13, "
Leather, skiving	Benjamin S. Mathews	Stamford, Ct	Ap'l 10, "
Saddles, harness*	Joseph W. Briggs	Cleveland, O	June 12, "
Saddles, spring	Jeremiah Rhoades and William Pouley	Shippensburg, Pa.	May 22, "
Saddles, spring seat	Robert Smith	Leesburgh, Pa	Aug. 28, "
Shoes, machines for cutting welts for	Charles Rogers	E. Bridgew'r, Mass.	May 29, "
Tan vats	Tarlton W. Brown	Howardville, Va	Ap'l 17, "
Tanning by electricity	Epidaurus Irving	New York, N. Y	Ap'l 24, "
Tanning leather by tannin and acids	Harmon Hibbard	Henrietta, N. Y	Oct. 16, "
Welt-cutting and splitting machines	John E. Tucker	Suffolk co., Mass.	Nov. 20, "
Welts, machines for cutting	Samuel Keen, Jr	E. Bridgew'r, Mass.	Sep. 4, "

* Improvement added, December 11, 1849.

CLASS XVII.—HOUSEHOLD FURNITURE, *Machines and Implements for Domestic Purposes, including Washing Machines, Bread and Cracker Machines, Feather Dressing, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Apple-parers	Charles P. Carter	Ware, Mass.	Oct. 16, 1849
Apples, paring, coring and slicing	Julius Weed	Painesville, Ohio	July 31, "
Baby tenders, locomotive	J. Cutts Smith	Boston, Mass.	Ap'l 3, "
Bedsteads	Benjamin Hinkley	Troy, N. Y	Dec. 25, "
Bedsteads	Nathaniel Colver	Boston, Mass.	Ap'l. 24, "
Bedstead fastenings	J. Parsons Owen	Norwalk, Ohio	Dec. 11, "
Bedstead fastenings	John Moulton	Ossipee, N. H.	Dec. 11, "
Bedstead fastenings	John D. Sanborn	Bennington, N. Y	April 3, "
Bedstead fastenings	James Brooke	Baltimore, Ohio	May 15, "
Bedstead fastenings	Devolt Stotlemeyer	Hancock, Md.	May 29, "
Bedstead fastenings	Henry Miller	South Bend, Ind	Aug. 7, "
Bedstead fastenings	Simeon Hovey	Painesville, Ohio	Aug. 28, "
Bedstead fastenings	James Taylor	Macon, Ga	Sept. 4, "
Bedsteads for invalids	Isaiah Buckman	South Woodstock, Vt	Ap'l 17, "
Bedsteads for invalids and others	Francis M. Webster	Newport, Ky	May 8, "
Bedsteads, invalid	John Karney	Cincinnati, Ohio	Oct. 23, "
Bedsteads, machinery for cutting screws on rails of	William F. Converse and Jonathan Burdge	Cincinnati, Ohio	Ap'l 24, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bedsteads, machinery for cutting screws in	Joseph Garside and Henry J. Betjemann	Harrison, Ohio	Aug. 28, 1849
Bedsteads, portable cot	Abraham McDonough	Philadelphia, Pa	July 10, "
Bedsteads, sofa	John A. Robson	New York, N. Y	Nov. 20, "
Bedsteads, sofa	Edwin B. Bowditch	New Haven, Conn	July 24, "
Bread making, preparation of flour for*	Henry Jones, assignor to John Fowler	Bristol, England. Baltimore, Md	May 1, "
Broom-brushes	Agdalena S. Goodman	Duval co., Fla	May 8, "
Brooms, machine for making	James Thomas	West Chester, Pa	Sept. 18, "
Broom, splint, machines	John Crum and Abraham Larwill	Ramapo, N. Y	Mar. 27, "
Carpet cleaning machines	Joseph Wentworth	Palatine, N. Y	Nov. 6, "
Carpets, machines to beat and brush	William Peters	Charlestown, Mass	July 31, "
Chairs, easy	Augustus Clarke	New York, N. Y	May 1, "
Chairs, fan	Daniel Linzie	Petersham, Mass	Ap'l 10, "
Chairs, fan rocking	Mary Ann Woodward	Palmyra, N. Y	Ap'l 24, "
Chairs, springs for	Thomas E. Warren	Troy, N. Y	Sept. 25, "
Clothes-pins, machinery for turning	Asa Greenwood	Marlboro', N. H	Dec. 11, "
Coffee-roasters	Thomas R. Wood	Cincinnati, Ohio	Ap'l 17, "
Cutlery, table, method of attaching the tang to the handle of	David N. Ropes	Meriden, Conn	May 29, "
Knives, machine for polishing	Asa Munger and Royal C. Taylor	Auburn, N. Y	Sept. 11, "
Lounge and chair combined	Abner T. Linikin	Roxbury, Mass	July 17, "
Mattresses, spring †	Patrick O'Neil	Philadelphia, Pa	Sept. 4, "
Meat-cutters	Allen Burdick	Glen's Falls, N. Y	Aug. 21, "
Musquito bars, frame for	L'Aimable P. Jacques	Cincinnati, Ohio	Ap'l 24, "
Rattans—see class XXII.			
Sausage machines	Thomas Lockett	Shoals of Ogeechee, Georgia	May 8, "
Table and bedstead, combined	Frank Leslie	New York, N. Y	Nov. 20, "
Tables, dining	John C. Nichols	Woburn, Mass	Aug. 21, "
Tables, extension	Theodore Franck	New York, N. Y	Ap'l 10, "
Tables, extension	Thomas P. Sherborne	Philadelphia, Pa	June 26, "
Tables for ship's cabins	William N. Boggs	Southborough, Mass	May 1, "
Vegetable cutters—see class I.			
Wash-boards	Orrin Rice	Cincinnati, Ohio	Oct. 30, "
Wash-boards, machines for making	William B. Stewart	Cincinnati, Ohio	Oct. 2, "
Washing machines	Sylvester Munson and William H. Pratt	Tremont, Ill	May 8, "
Washing machines	Daniel L. Walker	Roxbury, N. Y	June 19, "
Washing machines	Thomas King	West Farms, N. Y	July 3, "
Washing machines	Lewis W. Colver	St. Louis, Mo	July 3, "

* In England, March 13, 1845. † Antedated August 4, 1849.

CLASS XVIII.—ARTS, POLITE, FINE AND ORNAMENTAL, *including Music, Painting, Sculpture, Engraving, Books, Printing, Binding, Jewelry, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Account books, blank	Charles Hopkins	New York, N. Y	Nov. 27, 1849
Accounts, ledger, keeping	Andrew J. Folger	Nantucket, Mass	Oct. 30, "
Annunciators for railway carriages—see class X., "Carriages," &c.			
Books, machines for turning the leaves of	J. H. Schomacker and Martin Kuemerle	Philadelphia, Pa	Sep. 4, "

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Canvass, frames for stretching	Henry Bryant	Hartford, Conn	Sep. 25, 1849
Copying presses, portable	Henry M. Paine	Worcester, Mass	Oct. 2, "
Daguerreotype apparatus for panoramic views	Isaac Van Bunschoten, John J. Woodbridge and William E. Mann; Woodbridge & Mann, assignors to Van Bunschoten	New York, N. Y	Ap'l 17, "
Daguerreotype apparatus for gilding plates	William and William H. Lewis	New York, N. Y	May 8, "
Daguerreotype pictures, taking	John A. Whipple	Boston, Mass	Jan 23, "
Daguerreotype plates, apparatus for holding	William and William H. Lewis	New York, N. Y	Oct. 23, "
Daguerreotype plates, blocks for holding	Alexander Beckers	New York, N. Y	Oct. 23, "
Drawing boards	Henry W. Chamberlin	Pittsfield, Mass	Dec. 25, "
Education tables	Edwin Allen	Windham, Conn	May 1, "
Envelopes, machine for making	Jesse K. Park and Cornelius S. Watson, assignors to William W. Rose	New York, N. Y	Jan. 23, "
Flutes	Charles G. Christman	New York, N. Y	Dec. 25, "
Ink fountains	Elijah Jordan	W. Cummington, Mas	Nov. 20, "
Ink stands	Andrew Fife	Philadelphia, Pa	Aug. 21, "
Maps, making dissected	Samuel McCleary and John Pierce	Hoosic, N. Y	Sep. 25, "
Melodeons	Charles Austin	Concord, N. H	June 19, "
Musical instruments	Adoniram F. Hunt and James S. Bradish	Warren, Ohio	Jan. 9, "
Musical instruments	Joseph W. Prescott, assignor to A. and A. J. Prescott	Concord, N. H	Ap'l 17, "
Musical instruments, reed	B. T. Blodget and H. B. Horton	Akron, Ohio	June 19, "
Musical instruments, keyed	Joseph Alley and Henry W. Poole	Newburyport, Mass. Worcester, Mass	July 3, "
Musical notation	Ernest Von Heeringen	Pickinsville, Ala	June 12, "
Music stands	Henry W. Holly	Stamford, Conn	Feb. 6, "
Paper, machines for folding	Edward N. Smith, assignor to James H. Gray	W. Brookfield, Mass. Springfield, Mass	Nov. 27, "
Paper—see class III.			
Pens, fountain	David O. Macomber	New York, N. Y	Aug. 28, "
Pens, metallic	Matthew S. Fife	Philadelphia, Pa	April 3, "
Piano fortes*	James A. Gray	Albany, N. Y	Mar. 27, "
Piano fortes	Charles Horst	New Orleans, La	Ap'l 17, "
Piano fortes, elevating the tops of	Conrad Meyer	Philadelphia, Pa	Ap'l 10, "
Piano fortes, instruments for teaching music with the	Ernest Von Heeringen	Pickinsville, Ala	June 26, "
Piano fortes, sounding boards for	Richard Swan, Jr.	New Bedford, Mass	Nov. 20, "
Piano lock, eccentric—see class II., "Locks," &c.			
Pictures, shading, by metallic leaves	Emanuel Harmon	Cleveland, Ohio	Mar. 27, "
Printing paper hangings	William M. Shaw and Ezra Gould — Gould assignor to Shaw	Newark, N. J	May 1, "
Printing presses	Jason L. Burdick	Norwich, N. Y	Mar. 27, "
Postmarking letters, etc., machinery for—see class XXII.			
Ruling paper, machines for	William S. Wilder	Boston, Mass	Aug. 14, "

* Antedated Sep. 27, 1848.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Surfacing floor oil cloth	William Berry, assignor to James D. Sparkman and Melville Kelsey	Bedford, N. Y. Williamsburg, N. Y. Brooklyn, N. Y.	Oct. 23, 1849
Type casting machines*	John I. Sturgis	New York, N. Y.	Mar. 27, "
Types, casting	John Bachelder and Simon D. Dyer—Dyer assig'r to Bachelder	Boston, Mass. Chelsea, Mass.	July 24, "

* Antedated Sep. 27, 1846.

CLASS XIX.—FIRE ARMS AND IMPLEMENTS OF WAR, *and parts thereof, including the Manufacture of Shot and Gunpowder.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bullets or pills, machine for spherifying	Jonathan F. Ostrander	New York, N. Y.	Ap'l 3, 1849
Cannon, sectional, bolt and disk	Jesse Fitzgerald	New York, N. Y.	Feb. 6, "
Fire arms, breech loading	Lewis Jennings, assignor to George A. Arrowsmith	New York, N. Y.	Dec. 25, "
Fire arm, cartridge tube and conveyor, forming a repeating	Christian W. Büchel	New York, N. Y.	Feb. 20, "
Fire arms, concealed trigger for	Jacob Pecare and Josiah M. Smith	New York, N. Y.	Dec. 4, "
Fire arms, detached metallic cartridge tube, etc., for	David Minesinger	Beaver, Pa.	Feb. 27, "
Fire arms, method of revolving the hammer of repeating	Christian Sharps	Washington, D. C.	Dec. 18, "
Fire arm, method of connecting the hammer with the cylinder of a revolving	Edwin G. Ripley, administrator of the estate of Edwin Wesson	Hartford, Ct.	Aug. 28, "
Fire arms, moveable breeches for, and the locks and appurtenances for the same	Benjamin Chambers	Washington, D. C.	July 31, "
Fire arm, safety sliding breech	Chas. Hartung, assignor to John B. Klein	Beichlingen, Prussia New York, N. Y.	Nov. 13, "
Fire arm with several stationary barrels and a revolving hammer	George Leonard, Jr.	Shrewsbury, Mass.	Sep. 18, "
Gun barrels, method of boring	Henry Peeler	Boston, Mass.	Feb. 6, "
Gun, combined piston breech and firing cock repeating*	Walter Hunt, assignor to George A. Arrowsmith	New York, N. Y.	Aug. 21, "
Guns, faucet breech	Alonzo D. Perry	New York, N. Y.	Dec. 11, "
Lock, gun	William W. Marston	New York, N. Y.	June 5, "
Lock, gun, rotating tumbler	Thomas W. Harvey, assignor to Frederick Goodell	New York, N. Y. N. Rochelle, N. Y.	June 19, "
Lock for fire arms	Orison Blunt	New York, N. Y.	Dec. 25, "
Lock for fire arms	Jacob Post	Newark, N. J.	May 15, "
Lock, turning nipple, and concealed hammer	Andrew Wurfflein	Philadelphia, Pa.	Dec. 18, "

* In England, Dec. 10, 1847.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Percussion caps, machine for making	Richard M. Bouton	West Troy, N. Y.	Mar. 20, 1849
Powder magazines, methods of flooding and entering	Charles W. Copeland	Brooklyn, N. Y.	Nov. 6, "
Rifles, attachment of loading muzzle for	Daniel Smith	Scipio, N. Y.	Feb. 20, "
Shot, drop, method of manufacturing	David Smith	New York, N. Y.	May 22, "
Tent frames	Jesse E. Dow	Washington, D. C.	June 5, "

CLASS XX.—SURGICAL AND MEDICAL INSTRUMENTS, *including Trusses, Dental Instruments, Bathing Apparatus, &c.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Accoucheurs' chairs	Newman W. Smith	Shutesbury, Mass.	Oct. 16, 1849
Baths, shower	James Cortlan	Baltimore, Md.	Jan. 23, "
Baths, shower	Ephraim Larrabee	Baltimore, Md.	Jan. 2, "
Baths, shower	Jeremiah Essex	Bennington, Vt.	Sep. 25, "
Braces, body	Henry Mellish	Walpole, N. H.	Jan. 9, "
Braces, shoulder	Samuel S. Fitch	New York, N. Y.	June 5, "
Forceps, dentists'	Edward Bourne	New Bedford, Mass.	Sep. 25, "
Fractured or injured ankles, surgical apparatus for	George W. Yerger	Kensington, Pa.	Mar. 20, "
Hemorrhage, instruments for arresting from internal organs or cavities	Ashbel B. Haile	Norwich, Ct.	Oct. 16, "
Inhalers or lung protectors	Lewis P. Haslett	Louisville, Ky.	June 12, "
Lancets, spring	Joseph Ives	Bristol, Ct.	Mar. 27, "
Lancet, spring	James H. Johnson	St. Louis, Mo.	Ap'l 10, "
Legs, artificial	Benjamin F. Palmer	Meredith, N. H.	Feb. 20, "
Pessaries	Jonathan H. Robinson	Charlestown, Mass.	Aug. 7, "
Pessaries	Josiah B. Andrews	New York, N. Y.	Nov. 13, "
Shoulder braces—see class XXI.			
Supporters, abdominal	Herbert R. and Geo. W. Hubbard	Middletown, Ct.	Ap'l 17, "
Supporters, obstetrical	Abiather Pollard and Simeon Minkler	Au Sable, N. Y. Chazy, N. Y.	Ap'l 24, "
Supporters, spinal	Henry G. Davis	Millbury, Mass.	Aug. 28, "
Teeth, artificial	Henry Laurence	Philadelphia, Pa.	May 1, "
Teeth, compositions for filling	Asa Hill and Samuel G. Blackman	Norwalk, Ct.	Feb. 13, "
Teeth, making artificial	George E. Murray	Philadelphia, Pa.	Dec. 4, "
Teeth, setting	F. H. Clark	New York, N. Y.	Feb. 13, "
Tooth extractors	Enoch Osgood	Bangor, Me.	Jan. 9, "
Trusses	John W. Hood	Mt. Sterling, Ky.	Ap'l 17, "
Trusses	Abijah Smith, assignor to Giliad A. Smith	Kingston, N. Y. New York, N. Y.	May 1, "
Trusses	Lewis A. Hall	Newark, N. J.	May 8, "

CLASS XXI.—WEARING APPAREL, *Articles for the Toilet, &c., including Instruments for Manufacturing.*

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Band boxes, manufacture of	William Tabele	Hærlem, N. Y.	Oct. 9, 1849
Bonnets, pressing	C. C. Dow (a lady)	Thompson, Conn	July 10, "
Brushes, shaving	William S. Jewett	New York, N. Y.	Ap'l 10, "
Buckles, attaching to suspenders, &c.	John Abernethy	Woodbury, Ct.	July 3, "
Buckles, suspender	Sheldon S. Hartzhorn	Naugatuck, Ct.	Sep. 25, "
Buckles, suspender, machine for making	William Scarlett	Newark, N. J.	Ap'l 10, "
Buckles, suspender, machine for making	Charles A. Lent	Newark, N. J.	Jan. 30, "
Buttons, covered	Peter Kirkham, assignor to William R. Hitchcock & Co.	Birmingham, Eng. Waterbury, Ct.	Aug. 14, "
Buttons, manufacture of	Peter Kirkham, assignor to William R. Hitchcock & Co.	Birmingham, Eng. Waterbury, Ct.	Dec. 18, "
Buttons, manufacture of, from straw-board	Elisha M. Pomeroy	Wallingsford, Ct.	Aug. 21, "
Button moulds, manufacture of	Josiah Hayden and Rufus Hyde	Williamsburg, Mass. Chesterfield, Mass.	Aug. 7, "
Combs, ivory fine tooth, making	Fenner Bush and Julius H. Pratt	Meriden, Ct.	June 5, "
Hat brims, blocks for setting	Sylvester Billings	Spring Garden, Pa.	Aug. 7, "
Hat brims, curling	Francis Degen	New York, N. Y.	Nov. 13, "
Hats, manufacture of	Adrian Bancker and C. F. Alvord	New York, N. Y.	Jan. 9, "
Hooks and eyes for ladies' dresses*	Henry M'Evoy, assignor to W. Benjamin, Jr.	Birmingham, Eng. New York, N. Y.	Ap'l 17, "
Hooks and eyes, securing to tape and dresses	Charles Atwood	Birmingham, Ct.	Aug. 7, "
Hooks and eyes, attaching to cards	Charles Atwood	Birmingham, Ct.	Sep. 25, "
Pins, dress	Walter Hunt, assignor to Wm. and John Richardson	New York, N. Y.	Ap'l 10, "
Shears, tailors'	Benjamin W. Warner	New York, N. Y.	Jan. 9, "
Shoulder braces	Henry F. Briggs	Poughkeepsie, N. Y.	Ap'l 17, "
Suspenders, elastic cords for	Nelson Goodyear	New York, N. Y.	Oct. 16, "
Tailors' [illegible]	John Carpenter	Uniontown, Pa.	Ap'l 10, "
Tailors' measures	James M. Whitham	Washington, Pa.	Nov. 6, "

* In England, March 27, 1847.

CLASS XXII.—MISCELLANEOUS.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Bottles, cleansing	Munson C. Cronk	Auburn, N. Y.	Aug. 7, 1849
Bottle fasteners	Isaac Winslow	Philadelphia, Pa.	Dec. 18, "
Bottle stopper, undetachable swinging	Archibald H. Forbes	New York, N. Y.	Ap'l 10, "
Envelopes, machines for making—see class XVIII.			
Fire-escapes	George A. W. Hüttmann and George Koch Kornelio	Philadelphia, Pa.	Mar. 10, "
Fish-hook, spring snap	Job Johnson	Brooklyn, N. Y.	Mar. 20, "
Ice, machine for crushing	Alfred C. Hobbs and Jno. Brown	New York, N. Y.	Sept. 4, "
Postmarking letters, etc., machinery for	Emery N. Moore	Boston, Mass.	Jan. 16, "
Rattans, machinery for splitting and dressing	Sylvanus Sawyer	Templeton, Mass.	Nov. 13, "
Skate	Alexander Barclay and Charles W. Bontgen	Newark, N. J.	Ap'l 17, "
Trap, animal, adjustable platform	James Thomas	West Chester, Pa.	June 26, "
Trap, and method of setting it	Thomas A. Davies	New York, N. Y.	June 5, "
Water closets, portable	Charles C. Bier	New York, N. Y.	Nov. 13, "

PATENTS EXTENDED DURING THE YEAR 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF ORIGINAL PATENT.	EXPIRATION.	TERM OF EXTENSION.
Canals, transportation on, and railroads*	John Elgar	Baltimore, Md	Nov. 7, 1835	Nov. 7, 1849	Seven years from Nov. 7, 1849. Re-issued Dec. 25, 1849.
Casting chilled cylinders and cones	James Harley	Pittsburg, Pa	Mar. 3, "	Mar. 3, "	Seven years from March 3, 1849.
Felloes, &c., bending for carriage wheels	Edward Reynolds	Salem, N. J	July 17, "	July 17, "	Seven years from July 17, 1849.
Fire-arms	Samuel Colt	Hartford, Conn	Feb. 25, 1836	Feb. 25, 1850	Seven years from Feb'y 25, 1850. Re-issued Oct. 24, 1848.
Shoes, horse	Henry Burden	Troy, N. Y	Nov. 23, 1835	Nov. 23, 1849	Seven years from Nov. 23, 1849.
Stoves	Jordan L. Mott	New York, N. Y	July 21, "	July 21, "	Seven years from July 21, 1849.
Wrenches, screw	Solyman Merrick	Springfield, Mass	Aug. 17, "	Aug. 17, "	Seven years from Aug. 17, 1849. Re-issued May 17, 1842.

* Surrendered and re-issued under the title—"Boats, sectional, method of attaching to each other by means of a rule joint."

ADDITIONAL IMPROVEMENTS GRANTED DURING THE YEAR 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	IMPROVEMENT ADDED.
Lock, right and left hand	L. R. Livingston, J. J. Roggen and Calvin Adams	Pittsburg, Pa	May 1, 1849	June 5, 1849
Planters, seed	James D. Willoughby	Chambersburg, Pa	June 5, "	Nov. 20, "
Saddles, harness	Joseph W. Briggs	Cleveland, Ohio	June 12, "	Dec. 11, "
Scales, lever, for canals, railroads, &c	Ely Ellicott and Samuel A. Abbott	Philadelphia, Pa	Feb. 6, "	Aug. 14, "
Thrashing machines	Benjamin G. H. Hathaway	Rock Stream, N. Y	July 5, 1848	Nov. 6, "

PATENTS RE-ISSUED DURING THE YEAR 1849.

INVENTIONS OR DISCOVERIES.	PATENTEES.	RESIDENCE.	DATE OF PATENT.	DATE OF RE-ISSUE.
Barrel machinery	William Trapp, Jr	Dryden, N. Y	Oct. 1, 1845	Mar. 10, 1849
Bee-hives	Abraham Sanburn	Hamilton county, Ohio	Mar. 26, 1845	Feb. 13, "
Billiard tables, cushion for	Abraham Bassford	New York, N. Y	Dec. 5, 1848	Dec. 25, "
Canals, transportation on, and railroads*	John Elgar	Baltimore, Md	Nov. 7, 1835	Ext. & reissue Dec. 25, 1849
Churns, atmospheric	Nathan Chapin	Syracuse, N. Y	May 9, 1848	May 15, "
Cloth of all kinds, sewing with a running stitch	Benjamin W. Bean	New York, N. Y	Mar. 4, 1843	Mar. 10, "
Coal, machine for breaking	Joseph Battin	Newark, N. J	Oct. 6, 1843	Sept. 4, "
Docks, floating dry	John Thomas	Elizabethtown, N. J	Dec. 20, 1837	May 1, "
Felt fabrics, &c., machinery for making	Hezekiah S. Miller	Cincinnati, Ohio	Mar. 5, 1839	Ap'l 24, "
Fire-proof safes	Edward and Joseph Hall	Cincinnati, Ohio	Aug. 21, 1849	Dec. 18, "
Harvesting machines	Francis S. Pease	Buffalo, N. Y	Nov. 14, 1848	Dec. 18, "
India rubber, felting with cotton fibre †	Charles Goodyear	New Haven, Conn	June 15, 1844	Dec. 25, "
India rubber, processes for the manufacture of †	Charles Goodyear	New Haven, Conn	June 15, 1844	Dec. 25, "
India rubber goods, manufacture of, by means of zinc compounds	Henry G. Tyer and John Helm	New Brunswick, N. J	Jan. 30, 1849	Aug. 7, "
Looms for weaving carpets and other figured fabrics	Erastus B. Bigelow	Clintonville, Mass	May 1, 1842	Sep. 11, "
Looms, Brussels	Erastus B. Bigelow	Boston, Mass	Mar. 20, 1847	Sep. 11, "
Looms, power	Erastus B. Bigelow	Clintonville, Mass	Feb. 18, 1846	Sep. 25, "
Looms, power, for weaving plaids, &c	Erastus B. Bigelow	Clintonville, Mass	Ap'l 10, 1845	Oct. 9, "
Looms for weaving Brussels carpets, &c	Erastus B. Bigelow	Clintonville, Mass	Mar. 10, 1849	Oct. 9, "
Looms for weaving Brussels carpeting, &c	Erastus B. Bigelow	Clintonville, Mass	Mar. 13, 1849	Nov. 20, "
Mill for rolling irregular shapes by means of a cam pattern	John S. Hall	Columbus, Ohio	Jan. 30, 1849	Dec. 4, "
Registers, hot air	Charles F. Tuttle	Williamsburg, N. Y	Jan. 23, 1849	May 1, "
Saw mills for re-sawing boards and other timber	Pearson Crosby	Fredonia, N. Y	Nov. 3, 1841	Mar. 10, "
Screw wrenches	Loring Coes	Worcester, Mass	Ap'l 16, 1841	June 26, "
Seed planters	Moses and Samuel Pennock	East Marlborough, Pa	Mar. 12, 1841	Oct. 30, "
Ships, propelling	John Ericsson	New York, N. Y	Dec. 31, 1844	Mar. 10, "
Stoves, cooking	Elias Johnson and David B. Cox, assignors to R. D. Granger	Troy, N. Y. Albany, N. Y	July 22, 1845	June 19, "
Wool and cotton, preparing for carding	George L. Mason	Williston, Vt	Sept. 4, 1847	Mar. 20, "
Wool, machine for cleaning from burs and other foreign matter, and also for ginning cotton	Milton D. Whipple	Lowell, Mass	Oct. 28, 1840	July 31, "
Winnowing machines	John Thurston	Bath township, Ind	Jan. 6, 1848	Oct. 9, "

* Surrendered and re-issued under the title—"Boats, sectional, method of attaching to each other by means of a rule joint."

† Issued on one original patent.

CLASSIFIED LIST OF PATENTS—CONTINUED.

DESIGNS.

DESIGNS.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Carpets	Peter Lawson	Lowell, Mass.	Ap'l 3, 1849
Carpets	Peter Lawson	Lowell, Mass.	Ap'l 3, "
Carpets	Peter Lawson	Lowell, Mass.	Ap'l 3, "
Furniture ornaments	Isaac F. Baker, assignor to Cornelius & Co.	Philadelphia, Pa.	Ap'l 10, "
Furniture ornaments	Isaac F. Baker, assignor to Cornelius & Co.	Philadelphia, Pa.	Ap'l 10, "
Girandoles	William F. Shaw	Suffolk county, Mass.	Dec. 18, "
Grate, portable	Apollos Richmond, assignor to A. C. Barstow & Co.	Providence, R. I.	Sep. 11, "
Stoves	Joseph G. Lamb and Conrad Harris	Cincinnati, O.	Dec. 11, "
Stoves	Samuel Hill and William B. Cline	Philadelphia, Pa.	Dec. 4, "
Stoves	D. F. Goodhue and Charles Guild	Cincinnati, O.	Dec. 4, "
Stoves	Samuel Clark, assignor to Johnson & Cox	Troy, N. Y.	Nov. 13, "
Stoves	Samuel Clark, assignor to Johnson & Cox	Troy, N. Y.	Nov. 13, "
Stoves	Samuel H. Ransom	Albany, N. Y.	June 26, "
Stoves	Samuel H. Ransom	Albany, N. Y.	June 26, "
Stoves	Charles W. Warnich	Philadelphia, Pa.	June 26, "
Stoves	Samuel W. Gibbs, assignor to Augustus Quackenboss	Albany, N. Y.	June 26, "
Stoves *	Henry C. Fay	Troy, N. Y.	Mar. 10, "
Stoves	N. P. Peck	Springfield, Mass.	Jan. 23, "
Stoves	Samuel W. Gibbs, assignor to Jones & Finney	Albany, N. Y.—Pattonsburg, Va.	Mar. 20, "
Stoves	George E. Waring	Stanford, Conn.	Ap'l 10, "
Stoves	Charles J. Woolson	Cleveland, Ohio	Ap'l 10, "
Stoves	Abram Haney, assignor to J. & A. Morrison	Troy, N. Y.	Ap'l 17, "
Stoves	Samuel H. Ransom	Albany, N. Y.	Ap'l 24, "
Stoves	Abram Haney, assignor to Morrison and Tibbits	Troy, N. Y.	May 8, "
Stoves	Samuel W. Gibbs, assignor to North, Harrison & Co.	Albany, N. Y.—Philadelphia, Pa.	July 10, "
Stoves	Samuel Hill and William B. Cline	Philadelphia, Pa.	July 17, "
Stoves	Hosea H. Huntley, assignor to William C. Davis	Cincinnati, Ohio	Dec. 25, "
Stoves	William L. Sanderson, assignor to Dunham, Coller & Sage	Troy, N. Y.	Dec. 18, "
Stoves	Joseph G. Lamb and Conrad Harris	Cincinnati, Ohio	Aug. 7, "
Stoves	William L. Sanderson, assignor to Pease, Keeney & Gage	Troy, N. Y.	Aug. 21, "
Stoves	James Wager	Troy, N. Y.	Sep. 25, "
Stoves	James Wager	Troy, N. Y.	Sep. 25, "

DESIGNS.	PATENTEES.	RESIDENCE.	DATE OF PATENT.
Stoves	Calvin Fulton, assignor to John M. French	Rochester, N. Y.	Sep. 25, "
Stoves	George W. Chambers, assignor to A. Cox & Co.	Troy, N. Y.	Oct. 9, "
Stoves	George W. Chambers, assignor to A. Cox & Co.	Troy, N. Y.	Oct. 9, "
Stoves	S. H. Burton	Cincinnati, Ohio	Oct. 9, "
Stoves	Sherman S. Jewett and F. H. Root	Buffalo, N. Y.	Oct. 9, "
Stoves	William Savery	New York, N. Y.	Oct. 9, "
Stoves	Samuel W. Gibbs, assignor to J. Cross & Son	Albany, N. Y.—Morrisville, N. Y.	Oct. 9, "
Stoves	Edward B. Finch	Peekskill, N. Y.	Oct. 16, "
Stoves	James Wager	Troy, N. Y.	Oct. 23, "
Stoves	Hosea H. Huntley	Cincinnati, Ohio	Oct. 23, "
Stoves	John F. Rathbone	Albany, N. Y.	Oct. 23, "
Stoves	John F. Rathbone	Albany, N. Y.	Oct. 23, "
Stoves	John F. Rathbone	Albany, N. Y.	Oct. 23, "
Stoves	Abram Haney, assignor to Morrison & Tibbits	Troy, N. Y.	Nov. 6, "
Stoves	Samuel Clark, assignor to Johnson & Cox	Troy, N. Y.	Nov. 13, "
Stoves, air-tight	Moses Pond	Boston, Mass.	Oct. 23, "
Stoves, cooking	A. C. Barstow	Providence, R. I.	July 10, "

* Antedated December 2, 1848.

I.

ALPHABETICAL LIST OF PATENTEES FOR THE YEAR 1849.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6461	Abbott, Theodore T.	Speeder fliers	III.
	Abbott, Samuel A.—see Ellicott and Abbott.		
6575	Abernethy, John	Buckles, attaching to suspenders, &c.	XXI.
	Adams, Calvin—see Livingston, Roggen, and Adams.		
	Adams, Calvin—see Livingston, Roggen, Adams, Kendall and Vail.		
6521	Adams, Joseph and Levi, and Luther Henry Moore	Felloes, machine for cutting out	X.
6361	Adams, Nathaniel	Brick presses	XV.
6204	Akin, Samuel W.	Cultivators, cotton	I.
6909	Aldrich, James H.	Boring machines	XIV.
	Alexander, Lucius C.—see George and Brown.		
6693	Allen, Andrew, assignor to Charles J. Gardner	Looms, apparatus for operating shuttle-boxes for	III.
6407	Allen, Edwin	Education tables	XVIII.
6809	Allen, Enos G.	Planing machines	XIV.
6365	Allen, Enos G.	Planing machines	XIV.
6092	Allen, Horatio	Cut-off, adjustable lever, with secondary toe, No. 1	VI.
6093	Allen, Horatio	Cut-off, adjustable lever, with secondary toe, No. 2	VI.
6254	Allen, Thomas W., and Charles W. Noyes	Tires, iron wheel, machinery for making	X.
6565	Alley, Joseph and Henry W. Poole	Musical instruments, keyed	XVIII.
	Allyn, Edwin—see Joseph E. Andrews.		
	Alvord, Charles F.—see Bancker and Alvord.		
6728	Alvord, Joseph D.	Cars, couplings for	X.
6860	Anderson, James	Hemp machines	III.
6107	Anderson, Thomas K.	Heating, apparatus for, by vapor of alcohol	V.
	Andrew, William—see Bantz and Andrew.		
6396	Andrews, Joseph E., assignor to Edwin Allyn	Capstan, variable power	VII.
6861	Andrews, Josiah B.	Pessaries	XX.
6333	Andrews, Solomon and Job F. Halsey	Soda water, apparatus for making	IV.
6821	Arnold, Benjamin	Gearing	XIII.
6227	Arnold, William E.	Fastener, stopper, sash	II.
	Arrowsmith, George A.—see Walter Hunt.		
	Arrowsmith, George A.—see Lewis Jennings.		

6158	Ashcraft, Thomas	Presses, cotton	XII.
6628	Atwood, Charles	Hooks and eyes, securing to tape and dresses	XXI.
6745	Atwood, Charles	Hooks and eyes, attaching to cards	XXI.
6058	Augur, Hezekiah	Carving machines	XIV.
6485	Augur, Lebbeus and James L. Lord	Stops for carpenters' benches	XIV.
6543	Austin, Charles	Melodeons	XVIII.
6599	Avery, Wyllys	Vegetable cutters	I.
6292	Babcock, Fitch R.	Stoves, cooking	V.
6502	Babcock, Herman B.	Alloys, metallic	II.
6439	Bachelder, John	Sewing machines	III.
6604	Bachelder, John and Simon D. Dyer—Dyer assignor to Bachelder	Types, casting	XVIII.
6823	Bachofner, Henry	Looms	III.
6508	Bacon, Henry	Ploughs, corn, subsoil	I.
	Bacon, L. S.—see Washburn Race.		
6579	Bailey, Joshua	Waste, machinery for picking	III.
	Bain, Alexander—see Smith and Bain.		
6328	Bain, Alexander	Telegraphs, electric	VIII.
6024	Baker, Edward B.	Wheels, cast iron car	X.
215	Baker, Isaac F. assignor to Cornelius & Co.	Furniture ornaments	Design.
216	Baker, Isaac F. assignor to Cornelius & Co.	Furniture ornaments	Design.
	Baker, Isaac F.—see Cornelius and Welhelm.		
6298	Baker, Henry F.	Churn	I.
6424	Baker, Lyman	Rake teeth, spring	I.
6262	Baker, Samuel	Vessels, machine for paying seams of	VII.
	Baker, William H.—see Worthington and Baker.		
	Baldwin, Alfred D.—see James Bell.		
6535	Ball, William	Gold washer	II.
	Ballou, Otis D.—see Albert G. Bartlett.		
6010	Bancker, Adrian and Charles F. Alvord	Hats, manufacture of	XXI.
6464	Bancroft, Edward	Mill shafting	XIII.
6780	Bancroft, Edward	Mills, hanging shafts in	XIII.
6316	Bantz, Sidney A. and William Andrew	Bark, mills for grinding	XVI.
6330	Barclay, Alexander and Charles W. Bontgen	Skate	XXII.
	Barden, John S.—see Sheldon and Barden.		
6320	Barnard, Frederick S.	Valves, self adjusting, for regulating the admission of air to fan blowers	XI.
6230	Barnes, James	Bridges, eliptical or oval truss frame for	IX.
6191	Barnes, William T.	Water, apparatus for raising	XI.
6400	Barnes, William T.	Bellows	XI.
6256	Barnes, William T.	Auger-stock	XIV.
6917	Barnes, William T. assignor to Wesley Chase	Window sash, method of counterbalancing	II.
6185	Barnum, Daniel and Thomas J. Wells—Wells assignor to Barnum	Planing machine	XIV.

ALPHABETICAL LIST—Continued.

Numbers.	Patentees.	Inventions or discoveries.	Class.
	Barnum, Daniel—see Thomas J. Wells		
6334	Barr, Oliver	Harvesting machine	I.
227	Barstow, A. C.	Stoves, cooking	Design.
	Barstow, A. C. & Co.—see Apollos Richmond.		
6002	Bartholomew, Frederick H. and Solyman Merrick	Screw wrench for grasping cylindrical forms	II.
6105	Bartle, Warren S.	Boilers, steam, method of regulating the supply of water to	VI.
5992	Bartlett, Albert G.—Otis D. Ballou, administrator of	Drills, grain	I.
155	Bassford, Abraham	Billiard tables, cushion for	Re-issue.
142	Battin, Joseph	Coal, machine for breaking	Re-issue.
	Bay State Mills—see Milton D. Whipple.		
6739	Beach, Levi	Time pieces, mode of applying springs in	VIII.
6181	Beach, William	Curry-combs	II.
131	Bean, Benjamin W.	Cloth of all kinds, sewing with a running stich	Reissue.
6459	Beardsley, Charles S. and Simeon Wood	Planes, bench	XIV.
6005	Beardsley, Jonathan	Spikes, hook heading, by one motion, machine for	II.
6812	Beckers, Alexander	Daguerreotype plates, blocks for holding	XVIII.
6280	Bell, James	Roses for doors, porcelain, method of mounting	II.
6658	Bell, James, assignor to Alfred D. Baldwin	Fastener, combined sash and inside shutter	II.
	Benjamin, W. Jr.,—see Henry McEvoy.		
6244	Bennett, Alexander	Lamps, self lighting	V.
6096	Bennett, Isaac L.	Valves, piston, enclosed in the steam cylinder	VI.
6744	Benson, Hosea and Lorenzo D.	Staves, machinery for jointing	XIV.
	Benton, Luther B.—see Sabin and Benton.		
6712	Berney, Michael	Cars for dumping earth, &c.	X.
6816	Berry, William, assignor to James D. Sparkman and Melville Kelsey	Surfacing floor oil cloth	XVIII.
	Betjemann Henry J.—see Garside and Betjemann.		
6862	Bier, Charles C.	Water-closets, portable	XXII.
6035	Bigelow, Alfred, and Justus Butler	Looms	III.
6153 & 147.	Bigelow, Erastus B.	Looms for weaving Brussels carpets, &c.	III. and Re-issue.
6186 & 150.	Bigelow, Erastus B.	Looms for weaving Brussels carpeting, &c.	III. and Re-issue.
143	Bigelow, Erastus B	Looms for weaving carpets and other figured fabrics	Re-issue.
144	Bigelow, Erastus B.	Looms, Brussels	Re-issue.
145	Bigelow, Erastus B.	Looms, power	Re-issue.
146	Bigelow, Erastus B.	Looms, power, for weaving plaids, &c.	Re-issue.

Numbers.	Patentees.	Inventions or discoveries.	Class.
6806	Bigelow, Erastus B.	Looms, Jacquard	III.
	Billings, A. M.—see Sampson and Billings.		
6627	Billings, Sylvester	Hat brims, blocks for setting	XXI.
6699	Bishop, C. S.	Street sweeping machines	IX.
	Blackman, Samuel G—see Hill and Blackman.		
6951	Blanchard, Thomas	Wood, bending	XIV.
6718	Bleecker, Henry	Stoves, cooking, flues for	V.
6969	Bleecker, Henry and William E. and Samuel D. Vose	Castings, thin iron, process of making	II.
6222	Bleecker, William E.	Stoves, cooking	V.
6564	Bleecker, William E. and H. and Samuel D. Vose	Stoves, cooking	V.
6531	Blodget, B. T. and H. B. Horton	Musical instruments, reed	XVIII.
6766	Blodgett, Sherburne C. and John A. Lerow	Sewing machines	III.
6679	Bloom, Abram	Thrashing machines	I.
6650	Blunt, Edmund	Filters, arrangement of, for steam boilers	VI.
6966	Blunt, Orison	Lock for fire-arms	XIX.
6304	Blye, William H	Planes for bevel edges	XIV.
6649	Boardman, Horace	Boiler, steam, and furnace therefor, arrangement of	VI
6402	Boggs, William N	Tables for ships' cabins	XVII.
6417	Bolles, Jesse N., and Henry G. Knights	Drilling machines, rock, method of turning the drill in	IX.
6533	Bond, Alexander	Propeller, sculling	VII.
6648	Bonnell, David P.	Flouring, process of	XIII.
	Bonner, David—see Joseph M. Toy.		
	Bontgen, Charles W.—see Barclay and Bontgen.		
6197	Boone, Thomas G.	Carding machines	III.
6295	Boone, Thomas G., assignor to William C. Noyes	Twine, manufacture of	III.
6741	Bourne, Edward	Forceps, dentists'	XX.
6863	Bourshett, Thomas S.	Wheels, cast iron car	X.
6196	Bouton, Richard M.	Percussion caps, machine for making	XIX.
6607	Bowditch, Edwin F.	Bedsteads, sofa	XVII.
	Bowie, James A.—see R. B. Goodyer.		
6157	Boyd, Amos H.	Looms, delivery and take-up motion of	III.
6180	Boyden, Seth	Furnace for smelting zinc	II.
6444	Boynton, Abram D.	Boots and shoes, machinery for cutting soles of	XVI.
	Bradish, James S.—see Hunt and Bradish.		
6932	Brierly, Edward	Dyeing, apparatus for	IV.
6364	Briggs, Henry F.	Shoulder braces	XXI.
6465	Briggs, Joseph W	Hames	XVI.
6518 & 92.	Briggs, Joseph W.	Saddles, harness	XVI. and adt'l imp.
6490	Briggs, Joseph W., assignor to Fowler P. Taylor	Cockeyes for harness	XVI.
6965	Broad, Asa	Staves, machinery for dressing	XIV.
6451	Brooke, James	Bedstead fastenings	XVII.
6759	Brown, Andrew L.	Candles, mould, apparatus for making	IV.
6499	Brown, Edward R	Stoves, parlor cooking	V.

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
	Brown, Ephraim—see George and Brown.		
6511	Brown, George W.	Cultivators	I.
6697	Brown, George W.	Bolts, flour	XIII.
6078	Brown, Hiram C.	Weather strip, roller	IX.
6769	Brown, Israel F.	Saws, circular, machinery for filing	XIV.
	Brown, John—see Hobbs and Brown.		
6933	Brown, John T., and Moses Fuller	Brick presses	XV.
6391	Brown, Lewis	Bobbins, &c., cutting out cylinders for	III.
6340	Brown, Tarlton W.	Tan vats	XVI.
	Brown, Thomas—see Buell and Brown.		
6731	Bryant, Henry	Canvas, frames for stretching	XVIII.
6864	Bryant, Mertoun C.	Pulleys, binder, for belts and brakes	XIII.
6283	Bryant, Patrick	Spikes, instrument for drawing	II.
6447	Bryant, Patrick, assignor to Elkanah Ring, Jr., & Thos. Ring.	Hoops, cheese, &c., machines for cutting and slitting	XIV.
6136	Büchel, Christian W	Fire-arm, cartridge tube and conveyor, forming a repeating	XIX.
6440	Bucklin, Theodore G.	Castings preparing metallic patterns for	II.
6314	Buckman, Isaiah	Bedsteads for invalids	XVII
6598	Buell, Albert, and Thomas Brown	Smut machines	XIII.
6268	Bull, James H.	Gold washer, concentric centrifugal	II.
6503	Burckhardt, Christian	Fuel, consumption of, in steam boiler and other furnaces	V.
6792	Burden, Henry	Iron, machinery for drawing out and compressing heated	II.
	Burden, Henry	Shoes, horse	Extension.
	Burdge, Jonathan—see Converse and Burdge.		
6652	Burdick, Allen	Meat cutters	XVII.
6236	Burdick, Jason L.	Printing presses	XVIII.
6706	Burrel, Thomas and Edward	Straw cutters	I.
6822	Burt, Henry	Shingle machines, feed apparatus for	XIV.
6270	Burt, John	Doors, double hinged, water guard for	IX.
237	Burton, S. H.	Stoves	Design.
6492	Bush, Fenner, and Julius H. Pratt	Combs, ivory fine-tooth, making	XXI.
6238	Bushnell, Horace	Furnaces, air heating	V.
	Butler, Justus—see Bigelow and Butler		
6109	Call, Amos	Locks, door, by which one keyhole serves for two distinct keys	II.
6029	Callaghan, James	Dredging machines, method of directing the scoops in	IX.
6617	Callard, George	Lanterns, signal	V.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6044	Calvert, Francis A.	Wool, &c., manufacture of cylinders for burring	III.
6051	Calvert, Francis A.	Wool cleaning and lapping machine	III.
6662	Camp, Samuel H.	Tuyere, angular rotating	II.
6785	Campbell, Samuel	Lapping machines	III.
6614	Caples, Charles	Horse powers, equalizing the action of gearing in	XIII.
6566	Carlock, William B.	Bags and sacks, manufacture of	III.
6226	Carpenter, Emanuel W.	Plane irons, adjusting the position of, and regulating the throats of planes	XIV.
6286	Carpenter, John	Tailors' measures	XXI.
	Carr, Charles—see R. B. Goodyer.		
	Cart, Edward—see Watson and Cart.		
6458	Carter, Chandler	Boring and mortising machines	XIV.
6789	Carter, Charles P.	Apple parers	XVII.
	Carter, Harris and Carter—see Harris and Carter.		
6641	Carter, Ira Jr.	Presses, cheese, self acting	XII.
6456	Cary, Albigence W.	Pumps, rotary, packing for	XI.
6818	Cathcart, Andrew	Locomotives for ascending inclined planes	VI.
6119	Chaffee, Nelson E.	Drying machines	III.
6210	Chamberlain, Dexter H. assignor to William A. Dodge	Wrench, sliding	II.
6261	Chamberlain, Dexter H. assignor to William A. Dodge	Awl-haft	XVI.
6967	Chamberlin, Henry W.	Drawing boards	XVIII.
6612	Chambers, Benjamin	Fire-arms, moveable breeches for, and the locks and appurtenances for the same	XIX.
235	Chambers, George W. assignor to A. Cox & Co.	Stoves	Design.
236	Chambers, George W. assignor to A. Cox & Co.	Stoves	Design.
6583	Chandler, Thomas A.	Mills for grinding	XIII.
137	Chapin, Nathan	Churns, atmospheric	Reissue.
6755	Chapin, William A. Jr.	Lathes, varying the speed of the mandrel in	XIV.
6595	Chapman, Abner	Boiler flues, method of increasing the effective length of, and cleansing	VI.
6234	Chappell, Philip S. and William H.	Manures, artificial	I.
6878	Chase, John	Ox-yokes	I.
6466	Chase, Wesley	Fastening, opening and shutting blinds, method of	II.
	Chase, Wesley—see William T. Barnes.		
6125	Cheever, Levi T.	Fire kindling materials	V.
6326	Cherevoy, E. B.	Veneers, &c., machinery for cutting	XIV.
6568	Chichester, Lewis S.	Staves, machinery for jointing	XIV.
6004	Chinnock, Charles	Hubs and axles, connecting	X.
6087	Chollar, John B.	Stoves, plates for boiler holes and tops of	V.
6724	Christ, Abraham	Ploughs, land side	I.
6968	Christman, Charles G.	Flutes	XVIII.
6753	Clark, Charles	Flax &c., machinery for spinning	III.
6258	Clark, Ebenezer	Saws	XIV.

ALPHABETICAL LIST—CONTINUED

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6001	Clark, Edward	Lamp black and colophane, manufacture of	IV.
6335	Clark, Edwin and James M	Flour, machinery for separating from bran, &c	XIII.
6114	Clark, F. H	Teeth, setting	XX.
	Clark, Jacob H.—see Touchstone and Clark.		
249	Clark, Samuel, assignor to Johnson and Cox	Stoves	Design.
250	Clark, Samuel, assignor to Johnson and Cox	Stoves	Design.
251	Clark, Samuel, assignor to Johnson and Cox	Stoves	Design.
6416	Clarke, Augustus	Chairs, easy	XVII.
6784	Clarke, William	Paper engines, bed plates for	III.
	Cline, William B.—see Hill and Cline.		
6764	Clinton, Thomas G., George H. Knight and Edward H. Knight	Churn dashers, adjustable	I.
6798	Clinton, Thos. G., Geo. H. Knight, and E. H. Knight	Stoves, cooking	V.
6100	Cloud, Joseph C	Ploughs	I.
6446	Coad, Richard, assignor to Samuel G. Fisher	Combustion of fuel	V.
6501	Coats, Stephen	Plough, corn	I.
6089	Cobb, William	Stoves, cooking	V.
6660	Cochrane, James C	Fastener and stopper, self-acting, sash	II.
6653	Cochran, John W	Sawing ship timber, &c., mills for	XIV.
139	Coes, Loring	Screw wrenches	Re-issue.
6865	Coffeen, Goldsmith, Jr	Freezers, ice cream	IV.
6513	Coffin, Richard	Gates, railroad, machinery for operating by means of the locomotive	IX.
6142	Colburn, George F. I	Locks, door, protector slide for	II.
6520	Colby, George	Drill-barrows	I.
6824	Cole, James	Stoves	V.
	Cole, James—see Shields and Cole.		
6879	Cole, Luther	Scythe snaths	I.
31	Colt, Samuel	Fire-arms	Extension.
6577	Colver, Lewis W	Washing machines	XVII.
6726	Colver, Lewis W	Churn dashers, rotary	I.
6386	Colver, Nathaniel	Bedsteads	XVII.
6437	Conant, Jotham S	Sewing machines	III.
6026	Converse, A. T and William S. Cooley	Wheels, cast iron car	X.
6887	Converse, William F. and Jonathan Burdge	Bedsteads, machinery for cutting screws on rails for	XVII.
6022	Cook, James M	Wheels, cast iron car	X.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6121	Cook, Ransom	Ore separator, electro-magnetic	II.
	Cooley, William F.—see Converse and Cooley.		
	Cooper, Edward—see Scofield and Cooper.		
6842	Copeland, Charles W	Powder magazines, methods of flooding and entering	XIX.
6913	Copeland, Charles W	Valve, blow-off, of steam boilers, method of regulating the	VI.
6161	Corliss, George H	Gear, bevelled, machine for cutting teeth of	XIII.
6162	Corliss, George H	Valves, cut-off and working the, of steam engines	VI.
6603	Cornelius, Robt. and Chas. Welhelm, assignors to Robt. Cornelius and Isaac F. Baker	Lamp wick, elevator tubes for	V.
	Cornelius & Co.—see Isaac F. Baker.		
6033	Corser, Bliss	Clapboard machines	XIV.
6047	Cortlan, James	Baths, shower	XX.
	Cottle, Franklin D.—see Norton and Cottle.		
6237	Couch, Joseph J	Drilling rocks, machinery for	IX.
6457	Coult, Joseph C., and Augustus B. Davis	Churns, atmospheric	I.
	Cox, A. & Co.—see George W. Chambers.		
	Cox, David B.—see Johnson and Cox.		
6757	Cox, Green S	Composition for metallic packing in steam engines	IV.
6491	Cox, James, assignor to Jacob and John Pringle	Raising bricks, mortar, &c., extension machines for	XII.
6257	Cox, John J., and Samuel P	Water, raising and conveying	XI.
6683	Cox, Sam'l A., assignor to Matthias P. Sawyer & Jno. W. Hall	Railway chairs, machine for bending the lips of wrought iron	IX.
6880	Crafts, Ashley, and Ebenezer Weeks	Auger for boring earth	IX.
6918	Crafts, Ashley, and Ebenezer Weeks	Scraper, double revolving	IX.
6800	Crever, James A	Knobs, method of attaching to doors	II.
6804	Criswell, William	Horse collars, machines to manufacture	XVI.
6909	Croasdale, William	Plough and seed planter combined	I.
6354	Crocker, Samuel L	Nail, cut, from Muntz's metal	II.
6631	Cronk, Munson C	Bottles, cleansing	XXII.
6793	Crooker, Matthew A	Propellers, journals for oscillating	VII.
6922	Crosby, George—Camillus Kidder administrator of	File-cutting machines	II.
130	Crosby, Pearson	Saw-mills for re-sawing boards and other timber	Re-issue.
	Cross, J. and Son—see Samuel W. Gibbs.		
6233	Crum, John, and Abraham Larwill	Broom, splint, machines	XVII.
6263	Cumberland, John and William W	Compounds, lubricating	IV.
	Cummings, Perley D.—see Felton, Cummings and Hinckly.		
6040	Curtis, Lucius G	Telegraphs, indicating	VIII.
6366	Custer, Daniel	Drills, seed	I.
6559	Cutting, James A	Spark arresters	VI.
6014	Danforth, Charles	Drawing frames, stop motion for	III.
6259	Daniels, Reuben and Albert G. Dewey	Wool, &c., machinery for picking	III.
6495	Davies, Thomas A	Trap, and method of setting it	XXII.
	Davis, Augustus B.—see Coult and Davis.		
6680	Davis, Henry G	Supporters, spinal	XX.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6471	Davis, Samuel W.	Marble, imitations of	XV.
6038	Davis, Wilbur M.	Boxes, machinery for making	XIV.
	Davis, Wm. C.—see Hosea H. Huntley.		
6623	Davison, Thomas	Meats, salting	IV.
6064	Day, Jacob G.	Trucks, R. R.	X.
6578	Day, Jacob G. assignor to John L. Kingsley	Bolt and rivet machine, rotating disk	II.
6143	Day, Lewis K. and Preston	Temples, weavers'	III.
6019	Dean, Linus and A. Higham	Wheels, cast iron car	X.
6198	Dearborn, John M.	Ranges, cooking	V.
6661	Decker, John	Freezers, ice cream	IV.
6867	Degen, Francis	Hat brims, curling	XXI.
6376	De Haven, John J.	Fire box, removable, for locomotives	VI.
6768	De Haven, John J.	Fire boxes of steam boilers, removable water lining for the	VI.
6151	Delano, Calvin	Rakes, horse	I.
6952	Dempsey, Robert M.	Bran dusters	XIII.
	Derrick, Wm. H.—see Spring and Derrick.		
6028	Devlan, Patrick S.	Compound, lubricating	IV.
6610	Devlan, Patrick S. assignor to G. S. Langdon	Boot-heels, metallic	XVI.
	Dewey, Albert G.—see Daniels and Dewey.		
6049	Dickey, Ebenezer J.	Planters, seed	I.
6516	Diehl, David	Planters, seed	I.
6291	Diehl, Hannah and Charles M.—administrators of Wm. Diehl deceased	Nail plate feeder	II.
6182	Dimpfel, Frederick P.	Smoke consuming apparatus	VI.
6675	Doan, George N.	Drilling machines, combined construction and operation of the drill in	IX.
6772	Doane, Calvin	Ovens, portable	V.
	Doane, Hammond—see Goodman and Doane.		
6435	Dodge, George H.	Yarn, apparatus for spooling	III.
	Dodge, William A.—see Dexter H. Chamberlain.		
6102	Doty, Cyrus B.	Bricks, coloring	XV.
6722	Doughty, J. H.	Privies, signal for	IX.
6585	Dow, C. C. (Miss or Mrs.)	Bonnets, pressing	XXI.
	Dow, James La—see La Dow, James.		
6496	Dow, Jesse E.	Tent-frames	XIX.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6970	Dow, Phinehas	Borer and elevator, earth	IX.
6609	Downer, Charles	Unloading carts, &c., apparatus for	XII.
	Downs, Abel—see Birdsill Holly.		
6144	Draper, George	Temples, jaw, for looms	III.
6891	Dugard, Thomas	Saw mills, curvilinear	XIV.
6622	Dugdale, Joseph A.	Bee-hives	I.
	Dunham, Coller and Sage—see Wm. L. Sanderson.		
6478	Dunham, Daniel	Stoves, cooking	V.
6493	Dutton, Carlton	Rail-road turn-out	IX.
	Dyer, Simon D.—see Bachelder and Dyer.		
6135	Dyson, Jeptha	Carding-engines	III.
6344	Eastman, Arthur M.	Bobbins, driving	III.
6174	Eastman, Robt. assignor to Maria L. Eastman	Balances for weighing	XII.
6919	Eayrs, William	Stone dressing machines	XV.
6134	Eddy, James M., assignor to John Kimball	Turning irregular forms, machinery for	XIV.
6117	Edwards, William A.	Pearl-ash, manufacture of	IV.
6727	Egbert, D. N.	Churn dashers, rotary	I.
6371	Eldred, Allen	Hemp, &c., machinery for breaking and dressing	III.
6606	Eldred, Allen	Ploughs, hill-side	I.
6164	Elgar, John	Rail, two-part, tubular	IX.
154	Elgar, John	Canals, transportation on, and rail-roads*	Ext'n and Re-issue.
6303	Elgar, John and Benjamin Hallowell	Cradle, revolving, for unloading canal boats or sections thereof	IX.
6097 & 89	Ellicott, Ely and Samuel A. Abbott	Scale, lever, for canals, rail-roads, &c.	Addl. imp. and XII.
6401	Emerson, Richard H.	Locomotive with driving axle above the boiler	VI.
6676	English, Michael	Gold washer	II.
129	Ericsson, John	Ships, propelling	Re-issue.
6255	Ericsson, John	Steam engine, an auxiliary, employment of, in combination with the condenser pump	VI.
6844	Ericsson, John	Engine, arrangement of, for using steam expansively	VI.
	Ericsson, John—see Forbes and Ericsson.		
6332	Essex, Jeremiah	Squares, carpenters', machine for making	XIV.
6746	Essex, Jeremiah	Baths, shower	XX.
6061	Evans, Evan Lewis	Stoves, cooking	V.
6591	Ewing, David L.	Wheat-cleaning machines	I.
6827	Fagin, Lewis	Mills for grinding	XIII.
6169	Fairbanks, Thaddeus	Balances, double scale	XII.
6895	Fairbanks, Thaddeus	Scales, platform	XII.
6881	Falkman, Carl	Distilling and rectifying spirits	IV.
6192	Farrand, Jehial T.	Water, apparatus for drawing from wells	XI.
6756	Farrand, Jehial T., and William Hinman	Water, machinery for raising from wells	XI.
6316	Faulkner, Augustus	Looms for weaving	III.
6813	Faulkner, Augustus	Looms	III.

* Extended and re-issued under the title of—"Boats, sectional, method of attaching to each other by means of a rule joint."

ALPHABETICAL LIST—Continued

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
210	Fay, Henry C.	Stoves	
6067	Feinour, Joseph	Stoves, cooking	Design.
6041	Felton, Horace, Perley D. Cummings, and Harington Hinckly	Wheels, cast iron plate car	V.
6907	Fenton, C. W.	Pottery ware, glazing	X.
6323	Ferrell, William	Fastener, stopper, sash	XV.
6664	Fife, Andrew	Inkstands	II.
6278	Fife, Matthew S.	Pens, metallic	XVIII.
6018	Filkins, John D.	Bog-cutters	XVIII.
6657	Finch, Edward	Wheels, car, manufacture of	I.
241	Finch, Edward B.	Stoves	X.
6868	Finlay, James	Regulators for water wheels, &c.	Design.
6379	Finney, William C.	Cotton-scrapers	XIII.
6593	Fisher, Luther B.	Vegetables, cutting, crushing, and grinding	I.
6054	Fisher, M. and W. Martin, Jr.	Iron, cast, process for welding to wrought or steel	I.
	Fisher, Samuel G.—see Richard Coad.		II.
6569	Fisk, John W.	Winnowing machines	
6512	Fitch, Samuel S.	Braces, shoulder	I.
6090	Fitzgerald, Jesse	Cannon, sectional, bolt and disk	XX.
6670	Fitzgerald, Jesse	Treenails, machinery for dressing	XIX.
6688	Flack, John J.	Axles of carriages	VII.
6637	Flagg, Josiah F.	Spark arresters, locomotive, and smoke conductors	X.
6042	Flagg, J. F. B.	Railroads, rails and wheels for turning curves of	VI.
5994	Flanders, Joseph F.	Shears, circular, and beading tool, combined	IX.
6383	Fletcher, George, Sen.	Stone, machines for polishing	II.
6194	Flint, Tilly and Warren	Steelyards for weighing	XV.
6825	Folger, Andrew J.	Accounts, ledger, keeping	XII.
6802	Follet, Abner	Bog-cutting machines	XVIII.
6297	Forbes, Archibald H.	Bottle stopper, undetachable swinging	I.
6815	Forbes, Robert B., and John Ericsson	Distilling sea water, apparatus for	XXII.
6903	Forbush, Eliakim B.	Harvesting machines, form of teeth in	IV.
6142	Ford, Mason H.	Carriages, railway, annunciators for	I.
6399	Foss, Cotton	Grindstones, machines for making	X.
6377	Foster, Charles	Belts, rope, forks for holding upon drum wheels	XV.
6608	Foster, Junius	Hubs, connecting with axles	XIII.
6920	Foster, Samuel W.	Grain separators	X.
			I.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6450	Fountain, James L. and Henry K.	Harvesters	
	Fowler, John—see Henry Jones.		I.
6544	Francisco, Samuel P.	Churns, atmospheric	
6302	Franck, Theodore	Tables, extension	I.
	French, John M.—see Calvin Fulton.		XVII.
6148	Frost, Issachar, and James Monroe	Flour, machinery for separating from bran	
6682	Frost, John W.	Brick, machines for moulding	XIII
	Fuller, Moses—see Brown and Fuller.		XV.
234	Fulton, Calvin, assignor to John M. French	Stoves	
6486	Fulton, George W.	Pumps	Design.
6826	Furley, William	Barrel carriages	XI.
6934	Gardner, Abel	Hames, apparatus for bending	XI.
	Gardner, Charles J.—see Andrew Allen.		XVI.
6828	Garnsey, Ebenezer	Weather strip	
	Garrison, Thos.—see Hopper and Garrison.		IX.
6345	Garsed, Richard	Looms for weaving figured fabrics	
6668	Garside, Joseph and Henry J. Betjemann	Bedsteads, machinery for cutting screws in	III.
6368	Gatchel, Joshua L.	Rams, water	XVII.
6393	Gay, David	Beer fountains, portable	XI.
6325	George, Ammi M. and Ephriam Brown, George assignor to Nathan and Davis Richards, Ebenezer Waterman and Aaron Tay, and D. Richards. E. Waterman and A. Tay, assignors to N. Richards, and *Brown* assignor to Lucius C. Alexander	Spike machine, revolving die	IV.
6684	George, Dennis J. and Norman Millington	Squares, carpenters', graduating	II.
6070	Gerow, John L.	Stoves, cooking	XIV.
211	Gibbs, Samuel W. assignor to Jones and Finney	Stoves	V.
222	Gibbs, Samuel W. assignor to Augustus Quackenboss	Stoves	Design.
240	Gibbs, Samuel W. assignor to J. Cross and Son	Stoves	Design.
226	Gibbs, Samuel W. assignor to North, Harrison & Co.	Stoves	Design.
6352	Gilbert, George	Staves, machinery for dressing	Design.
6538	Gill, George E. and Joseph B. Tillinghast	Churns	XIV.
6692	Gilman, Alonzo, assignor to Wm. Johnson	Paper, machines for cutting	I.
6494	Gilmore, Arza	Bee hives	III.
6165	Goffin, Francis Charles	Lock, door, by a combined key and guage; also a thief detector	I.
6522	Goffin, Francis C. and Conrad Liebrich	Lock, pad	II.
	Goodell, Frederick—see Thos. W. Harvey.		II.
252	Goodhue, D. F. and Charles Guild	Stoves	
6123	Goodman, Agdalena S.	Broom brushes	Design.
6843	Goodman, Allen, and Hammond Doane	Lathes for turning	XVII.
156	Goodyear, Charles	India rubber, felting with cotton fibre	XIV.
157	Goodyear, Charles	India rubber, process for manufacture	{ two re-issues on
6786	Goodyear, Nelson	Suspenders, elastic cords for	{ one patent.
			XXI.

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6170	Goodyer, Robt. B. assignor to James A. Bowie and Charles Carr	Looms, apparatus for operating shuttle boxes of	III.
6571	Gore, Emory and Emerson	Wind mills	XI.
	Gould, Benjamin—see Joseph W. Webb.		
	Gould, Ezra—see Shaw and Gould.		
6068	Granger, R. D.	Stoves, cooking	V.
6069	Granger, R. D.	Stoves, cooking	V.
	Granger, R. D.—see Johnson and Cox.		
6046	Grant, William	Lathes, chucks for	XIV.
	Graverend, Raymond—see Pratt and Graverend.		
6661	Gray, A. N.	Whiffletree hook	X.
6223	Gray, James A.	Piano-fortes	XVIII.
	Gray, James H.—see Ed. N. Smith.		
6012	Green, Benjamin H.	Telegraph wires, painting	IX.
6801	Green, Thomas J.	Gold washers, rockers of	II.
6737	Greene, James D.	Boats, life, form of the air chambers of	VII.
6935	Greenwood, Asa	Clothes pins, machinery for turning	XVII.
6071	Grenville, Alonzo S.	Compound, lubricating	IV.
6120	Grice, Francis	Vessels, blocks for supporting bilges and keels of	VII.
6489	Griest, Gideon	Brakes for carriages	X.
6411	Gridley, Josiah A.	Churn dashers	I.
6123	Grinnell, Samuel H.	Rakes, horse	I.
	Guild, Charles—see Goodhue and Guild.		
6441	Guild, Martin	Ropes, machinery for laying	III.
6796	Haile, Ashbel B.	Hemorrhage, instruments for arresting from internal organs or cavities	XX.
6245	Haines, Jonathan	Harvesting machines	I.
6403	Haines, William M.	Calculating machines	VIII.
6479	Halbert, Horace	Stoves, cooking	V.
6777	Hall, Alexander	Churns	I.
6655 & 152	Hall, Edward and Joseph L.	Fire proof safes	V. & Re-issue.
6079 & 151	Hall, John S.	Mill for rolling irregular shapes by means of a cam pattern	II. & Re-issue.
	Hall, John W.—see Samuel A. Cox.		
6425	Hall, Lewis A.	Trusses	XX.
	Hallowell, Benjamin—see Elgar and Hallowell		

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
	Halsey, Job F.—see Andrews and Halsey.		
219	Haney, Abram, assignor to J. A. Morrison	Stoves	Design.
221	Haney, Abram, assignor to Morrison and Tibbits	Stoves	Design.
248	Haney, Abram, assignor to Morrison and Tibbits	Stoves	Design.
6076	Harbach, Frederick	Furnace, multiple grate for locomotive boilers	VI.
6735	Harwick, Peter W.	Fruit, paring and coring	I.
	Hargitt, Godfrey—see Waldran and Hargitt.		
30	Harley, James	Casting chilled cylinders and cones	Extension.
6241	Harmon, Emanuel	Pictures, shading by metallic leaves	XVIII.
	Harper, Benjamin—see John W. Hoffman.		
	Harris, Conrad—see Lamb and Harris.		
6846	Harris, Daniel K. and John K.	Mowing machines	I.
6847	Harris, D. W. and E. P. Carter, assignors to Carter, Harris and Carter	Corn shellers	XIII.
6027	Harris, Ephraim	Tuyere, blacksmiths' rotary	II.
	Harris, William R.—see Holton and Harris.		
6971	Hart, Carmi	Wheels, cast iron car	X.
6269	Hart, Carmi and Nathan Washburn	Wheels, cast iron car	X.
6936	Hartley, Lewis M.	Lock, double bolt trick	II.
6869	Hartshorne, Charles and William B. Shaw	Lasts, machinery for turning right and left	XVI.
	Hartshorn, Charles—see Webber and Hartshorn		
6871	Hartung, Charles, assignor to J. B. Klein	Fire arm, safety sliding breech	XIX.
6736	Hartzhorn, Sheldon S.	Buckles, suspender	XXI.
6537	Harvey, Thomas W. assignor to Frederick Goodell	Lock, gun, rotating tumbler	XIX.
6529	Haslett, Lewis P.	Inhalers, or lung protectors	XX.
6754	Hatch, Warren D.	Cars, couplings for	X.
6334	Hatfield, Robert G. and Oliver P.	Railway propeller	X.
90	Hathaway, Benj. G. H.	Thrashing machines	Additional Improv.
6380	Hatheway, Gilbert	Saw mills with cylindrical saws	XIV.
6077	Hay, Adam	Wrench, hinged claw	II.
6758	Hayden, Daniel W.	Carding machines	III.
6635	Hayden, Josiah and Rufus Hyde	Button moulds, manufacture of	XXI.
6229	Hayden, Whiting	Guides for warpers	III.
6063	Hayes, John P.	Baking apparatus	V.
6201	Hayes, John P.	Furnaces, portable hot air	V.
6432	Hedge, Lemuel	Saw-mills	XIV.
	Heeringen, E rnest Von—see Von Heeringer.		
	Helm, John—see Tyer and Helm.		
6183	Herries, William	Grain gatherers	I.
6710	Hershey, Isaac S.	Hides, machines for breaking	XVI.
6505	Heygel, Joseph	Smut machines	XIII.
6782	Hewet, Henry W.	Propellers, reciprocating	VII.
6790	Hibbard, Harmon	Tanning leather by tannin and acids	XVI.

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6388	Hibbard, William C.	Hemp, machinery for spinning	III.
6025	Hibbert, James	Knitting needles	III.
	Hicks, Coleman—see Peck and Hicks.		
6429	Hicks, William C.	Rail-way switches, method of operating	IX.
6152	Higgins, John and Hiram H.	Cloth, machinery for dressing and folding	III.
	Higham, A.—see Dean and Higham.		
6110	Hill, Asa, and Samuel G. Blackman	Teeth, compositions for filling	XX.
253	Hill, Samuel, and William B. Cline	Stoves	Desgin.
228	Hill, Samuel, and William B. Cline	Stoves	Design.
6646	Hills, Edwin	Steam-tables	IV.
	Hinckly, Harington—see Fulton, Cummings and Hinckly.		
6972	Hinkley, Benjamin	Bedsteads	XVII.
	Hinman, William—see Farrand and Hinman.		
6475	Hinton, John	Harvesters of clover heads	I.
	Hitchcock, James R.—see Southworth and Hitchcock.		
	Hitchcock, Wm. R. & Co.—see Peter Kirkham.		
6690	Hobbs, Alfred C. and John Brown	Ice, machine for crushing	XXII.
6762	Hodge, Nehemiah	Brakes for cars, mode of operating	X.
6412	Hodgman, Daniel and Amos D. Wyckoff	Mats, &c., machinery for making	III.
6299	Hoffman, John M.	Centre-board, folding	VII.
6584	Hoffman, John W.	Stopper, sash, spring and tackle	II.
6548	Hoffman, John W. assignor to Lewis B. Kelly and Benj. Harper	Railroad track, lever to be placed on a, and acted upon by the wheels of cars or locomotives	IX.
6921	Hoffman, John W. assignor to Henry A. Landry	Frog for railroad	IX.
	Holland, William—see Homer and Holland.		
6337	Hollingsworth, J. M. assignor to J. M. and L. Hollingsworth	Paper, machinery for taking and laying from the cutting engine	III.
6500	Holly, Birdsill, assignor to Abel Downs, Edward Mynderse, Horace C. Silsby and Washburn Race	Pumps	XI.
6094	Holly, Henry W.	Music stands	XVIII.
6691	Holton, Simeon Jr. and William R. Harris	Looms, machines for weaving harness for	III.
6336	Honey, Joseph S.	Cultivator teeth	I.
6338	Hood, John W.	Trusses	XX.
6905	Hopkins, Charles	Account books, blank	XVIII.
6430	Hopkins, John	Brewing and preserving alcoholic drinks	IV.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6892	Hopkins, Stevens D.	Gates, flood, for fences	IX.
5996	Hopper, Thomas, and Thomas Garrison	Journals and boxes	X.
6733	Horn, Edwin B.	Lock, door	II.
6103	Horn, Edwin B.	Lamps, camphine	V.
6770	Horner, Eli R., and William Holland	Boot-crimps	XVI.
6342	Horst, Charles	Piano-fortes	XVIII.
	Horton, H. B.—see Blodget and Horton.		
6178	Hotchkiss, Andrew	Curry-combs	II.
6592	Hotchkiss, Andrew	Ox-yoke fastenings	I.
6369	Hotchkiss, David, and Benjamin R. Norton	Spectacle glasses	VIII.
6202	Houghton, Harvey—Lucretia Houghton, administratrix of	Bell telegraph	II.
6674	Hovey, Simeon	Bedstead fastenings	XVII.
6251	Howard, John C.	Steam engines, rotary	VI.
	Howe, Elias, Jr.—see Reed and Howe.		
6848	Howell, A. J.	Winnowing machines	I.
6321	Hoyt, William	Locomotives, cog gearing of, for ascending inclined planes	VI.
6353	Hubbard, Herbert R., and George W.	Supporters, abdominal	XX.
6384	Hubbs, Paul K.	Filtering apparatus for steamboat boilers	VI.
6389	Huff, Samuel	Churns	I.
	Hughes, Daniel—see John Wright.		
	Hughes, Stephen—see Learned and Hughes.		
6006	Hunt, Adoniram F. and James S. Bradish	Musical instruments	XVIII.
6281	Hunt, Walter, assignor to William and John Richardson	Pins, dress	XXI.
6663	Hunt, Walter, assignor to George A. Arrowsmith	Gun, combined piston breech and firing cock repeating	XIX.
6147	Hunter, Stephen R. and Mead Merrill	Hubbs and axles, manufacture of	X.
6131	Huntington, Samuel	Lasts, &c., machinery for turning right and left from the same pattern	XVI.
244	Huntley, Hosea H.	Stoves	Design.
257	Huntley, Hosea H., assignor to W. C. Davis	Stoves	Design.
6498	Hutchinson, Charles B.	Wind-mills	XI.
6155	Hüttmann, George A. W. and George Koch Kornelio	Fire-escapes	XXII.
6276	Hyde, Hiram T.	Springs, carriage	X.
	Hyde, P. L.—see Amos W. Snow.		
	Hyde, Rufus—see Hayden and Hyde.		
6373	Irving, Epidaurus	Tanning by electricity	XVI.
6358	Isbister, Caleb.	Stoves, coal, grates for	V.
6760	Isham, Norman M. and Erastus E. Marcy	Steel, process of making	II.
6240	Ives, Joseph	Lancets, spring	XX.
6073	Jack, Samuel, 2d	Drilling machine, combined spring rock	IX.
6213	Jackson, Israel	Carriage bodies, hanging	X.
6390	Jacques, L. Aimable Prosper	Musquito bars, frame for	XVII.
6937	Jeffery, Edwin A.	Pump pistons, packing	XI.
6106	Jenkins, Henry	Fences, wire	IX.

ALPHABETICAL LIST—Continued.

Number.	Patentees.	Inventions or Discoveries.	Class.
6938	Jenks, Alfred	Drawing heads, mode of changing the gearing of, while in motion	III.
6763	Jenks, Lemuel P.	Gold washers, arrangements of the conductors in centrifugal	II.
6716	Jenney, Franklin	Shingles, machinery for dressing	XIV.
6410	Jennings, Lewis	Gold washer	II.
6973	Jennings, Lewis, assignor to George A. Arrowsmith	Fire-arms, breech-loading	XIX.
6267	Jennison, William H.	Gold washer	II.
6408	Jennison, William H.	Filtering diaphragm, self-regulating	XI.
6829	Jeter, Hugh, assignor to Jeter and Watson	Planing machines	XIV.
238	Jewett, Sherman S. and S. H. Root	Stoves	Design.
6293	Jewett, William S.	Brushes, shaving	XXI.
6685	Jobes, Samuel	Staves, machinery for jointing	XIV.
6910	Johnson, A. and H.	Cocks, stop, and filters, in combination	XI.
	Johnson and Cox—see Samuel Clark.		
138	Johnson, Elias, and David B. Cox, assignors to R. D. Granger	Stoves, cooking	Re-issue.
6288	Johnson, James H.	Lancet, spring	XX.
6207	Johnson, Job	Fish-hook, spring snap	XXII
	Johnson, Joseph B.—see Morey and Johnson.		
6175	Johnson, William J.	Presses, cotton	XII.
	Johnson, William—see Alonzo Gilman.		
6700	Johnston, David	Stoves, cooking	V.
6188	Johnston, John, and John D. Snyder	Cloth, apparatus for dressing	III.
6366	Johnston, Joseph	Flour, machinery for separating from bran	XIII.
6915	Jones, Daniel, Jr.	Bells, fog, method of ringing, and an adjustable clapper for the same	VII.
	Jones and Finney—see Samuel W. Gibbs.		
6418	Jones, Henry, assignor to John Fowler	Bread making, preparation of flour for	XVII.
	Jones, Henry C.—see Henry Ritchie.		
6883	Jordan, Elijah	Ink fountains	XVIII.
6166	Joslin, William	Rope machinery	III.
6721	Kaighn, Elias	Stoves, cooking	V.
6814	Karney, John	Bedsteads, invalid	XVII.
	Keane, James and Thomas—see C. R. Tisdale and Keanes.		
6695	Keen, Samuel, Jr.	Welts, machines for cutting	XVI.
6870	Kellogg, John	Hubs, connecting to axles	X.

Number.	Patentees.	Inventions or Discoveries.	Class.
6101	Kellogg, Lansing	Presses, cheese	XII
	Kelly, Lewis B.—see John W. Hoffman.		
	Kelsey, Melville—see William Berry.		
	Kendall, Amos—see Livingston, Roggen, Adams, Kendall, and Vail.		
6277	Kendall, Stephen	Punching machine	II.
6313	Kendall, Thomas	Drilling, sub-marine rock, apparatus for	IX.
6382	Kepler, Israel	Corn shellers	XIII.
6467	Kershaw, Edward	Keyhole protector	II.
	Ketchum, D. O.—see George Scott.		
	Kidder, Camillus—see George Crosby.		
	Kimball, John—see James M. Eddy.		
6140	King, Julius	Nuts and bolt-heads, machine for dressing	II.
6209	King, Julius	Cut-off, adjustable	VI.
6574	King, Thomas	Washing machines	XVII.
6799	Kingsland, Cornelius	Grate bars	V.
	Kingsley, John I.—see Jacob G. Day.		
6830	Kinman, Nathan	Packers, flour	XII.
6659	Kirby, Josiah	Treenail machine	VII.
6953	Kirkham, Peter, assignor to Wm. R. Hitchcock & Co.	Buttons, manufacture of	XXI.
6651	Kirkham, Peter, assignor to Wm. R. Hitchcock & Co.	Buttons, covered	XXI.
	Klein, J. B.—see Charles Hartung.		
6904	Knapp, Cyrus	Milking cows, instruments for	I.
	Knight, Geo. H. and Ed. H—see Clinton and Knights.		
6524	Knight, Isaac	Trucks for railroad cars	X.
	Knights, Henry G.—see Bolles and Knights.		
6370	Knowles, Hazard, assignor to John Levy	Tonguing and grooving, cutters for	XIV.
6039	Knowles, Hazard	Mill bushes	XIII.
6294	Knowles, Hazard, assignor to John Levy	Planing machines	XIV.
6738	Knowles, Hazard	Veneering, cauls for	XIV.
	Kornelio, George Koch—see Hüttmann and Kornelio.		
6954	Krauser, Samuel	Harvesters, clover	I.
6586	Krechler, Charles A.	Distilling apparatus	IV.
	Kuemerle, Martin—see Schomacker and Kuemerle.		
6771	Lacharme, Louis	Gold Washers	II.
6613	La Dow, James	Boots and shoes, machines for pegging	XVI.
6473	Laird, Joshua	Knobs, shank for mineral door	II.
229	Lamb, Joseph G., and Conrad Harris	Stoves	Design.
254	Lamb, Joseph G., and Conrad Harris	Stoves	Design.
	Landry, Henry A.—see John W. Hoffman.		
	Langdon, G. S.—see Devlan and Langdon.		
5993	Larrabee, Ephraim	Baths, shower	XX
	Larwill, Abraham—see Crum and Larwill		

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6301	Laubereau, Francis Joseph	Engine, air	XI.
6406	Laurence, Henry	Teeth, artificial	XX.
6443	Law, Hervey	Staves, machinery for dressing	XIV.
6309	Law, Hervey	Planing machines	XIV.
212	Lawson, Peter	Carpets	Design.
213	Lawson, Peter	Carpets	Design.
214	Lawson, Peter	Carpets	Design.
6189	Lawton, H. B., and H. T.	Cotton batting	III.
5999	Layman, Jesse	Ploughs	I.
6463	Layton, William Y.	Gins, cotton	III.
6902	Learned, Charles, and Stephen Hughes	Flour, machinery for dressing	XIII.
6085	Learned, Elijah	Hoisting apparatus	XII.
6831	Leavenworth, Lucius	Fences	IX.
6775	Leffel, James	Stoves, cooking	V.
5998	Leland, Abner	Ploughs, combined	I.
6074	Lent, Charles A.	Buckles, suspender, machine for making	XXI.
	Leonard, Francis—see John Wright.		
6723	Leonard, George, Jr.	Fire-arm with several stationary barrels and a revolving hammer	XIX.
	Lerow, John A.—see Blodgett and Lerow.		
6884	Leslie, Frank	Table and bedstead, combined	XVII.
6348	Levington, Robert	Boxes for R. R. cars	X.
	Levy, John—see Hazard Knowles.		
6730	Lewis, H. L. B.	Cars, couplings for	X.
	Lewis, Joseph—see Mac Lardy and Lewis.		
6819	Lewis, William, and William H.	Daguerreotype plates, apparatus for holding	XVIII.
6431	Lewis, William, and William H.	Daguerreotype apparatus for gilding plates	XVIII.
	Liebrich, Conrad—see Goffin and Liebrich.		
6832	Lightbown, Roger	Looms, power	III.
6811	Lighthall, William A.	Steam engines, arrangment of the lever half beam of	VI.
6872	Lillie, Lewis	Locks, means of changing the combination of revolving tumbler	II.
6469	Lincoln, Abraham	Vessels, method of lifting over shoals	VII.
6130	Lindsay, William H.	Fluid metre	VI.
6749	Linhart, Adam, and Samuel McClain	Grain carriers, construction of	I.
6594	Linikin, Abner T.	Lounge and chair combined	XVII.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6307	Linzie, Daniel	Chairs, fan	XVII.
6794	Livermore, Benjamin	Boot crimps	XVI.
6409 & 88.	Livingston, L. R., John Jay Roggen and Calvin Adams	Lock, right or left hand	II. & Addt. Impt.
6779	Livingston, L. R., J. J. Roggen, Calvin Adams, Amos Kendall, and Alfred Vail	Telegraph wires, supporters for	VIII.
6341	Lloyd, Charles C.	Blast generators	XI.
6422	Lockett, Thomas	Sausage machines	XVII.
6367	Loper, R. F.	Boilers, arrangement of flues in marine	VI.
6673	Loper, R. F.	Engine, method of working the air pump and using a condensing as a non-condensing	VI.
	Lord, James L.—see Augur and Lord.		
6833	Lotze, Adolphus	Stoves	V.
6315	Low, Joseph J.	Spectacle frames	VIII.
6045	Luter, Elisha	Shingle and stave-dressing machines	XIV.
6955	Lyman, Azel S.	Alarm for indicating want of water in boilers	VI.
6704	Lyon, David W.	Hinges, machine for forming the eyes of	II.
6572	Mac Lardy, William, and Joseph Lewis	Spindles, live, and fliers	III.
6000	Macomber, Arunah S.	Turning	XIV.
6672	Macomber, David O.	Pens, fountain	XVIII.
6242	Mallerd, Samuel	Dyeing	IV.
6172	Mallow, Henry	Forebays, regulating	XI.
6540	Mann, Jacob J., and Henry F.	Harvesting machines, grain carriers for	I.
6742	Mann, Samuel	Presses, cheese, self acting	XII.
	Mann, William E.—see Van Bunschoten, Woodbridge and Mann.		
6560	Manny, Pells	Harvesters	I.
	Marcy, Erastus E.—see Isham and Marcy.		
6834	Marsh, David, and Eli B. Nichols	Mills for grinding	XIII.
6939	Marshall, Moses	Looms for weaving figured fabrics	III.
6514	Marston, William W.	Lock, gun	XIX.
6534	Martin Ebenezer F.	Stoves, cooking	V.
6681	Martin, James W., and Edwin Parry	Chucks	XIV.
	Martin, W. Jr.—see Fisher and Martin.		
6849	Mascher, J. F.	Regulators	XIII.
6774	Maskell, Thomas	Centre-board, keel	VII.
133	Mason, George L.	Wool and cotton, preparing for carding	Re-issue.
6638	Mason, Nicholas	Stoves, cooking	V.
6923	Mason, Nicholas	Ranges, cooking	V.
6322	Massey, John	Driers, grain, endless bands for	V.
6573	Massey, William	Bands, wrought iron, machine for contracting the circumference of	II.
6773	Masterson, William G.	Water wheels	XI.

ALPHABETICAL LIST—Continued.

Number.	Patentees.	Inventions or Discoveries.	Class.
6290	Mathews, Benjamin S.	Leather, skiving	XVI.
6787	Mathews, Hannibal	Stoves, cooking	V.
	Matlack, John A.—see Radebaugh and Matlack.		
6116	Matthew, David	Spark and gas consumers	VI.
6206	Matthewson, Erastus C.	Railroad switches, self-adjusting	IX.
6160	Maxim, Marcus	Spike machine	II.
6378	McAulay, Malcom	Gins, cotton	III.
6462	McCammon, William	Cut-off, disk, acted upon and regulated by the governor	VI.
6003	McCarty, James	Skelps, from which iron tubes are made, method of bending	II.
6956	McCarty, James	Tube, combined lap and butt welded	XI.
6539	McCarty, John	Carding machines	III.
6187	McCleary, Andrew	Spark arrester, spiral	VI.
6747	McCleary, Samuel, and John Pierce	Maps, making dissected	XVIII.
6141	McComb, David	Presses	XII.
6017	McCulley, Joseph	Skelps, tube, dies for bending	II.
6588	McDonough, Abraham	Bedsteads, portable cot	XVII.
6329	McEvoy, Henry, assignor to W. Benjamin, Jr.	Hooks and eyes for ladies' dresses	XXI.
6355	McFarlan, Amos B.	Brakes, carriage	X.
6173	McGinley, John	Boots and shoes, spring shanks for	XVI.
6324	McKay, Gordon	Cut-off, piston valve	VI.
6108	McKinney, Almeron, and David Tyler	Presses, cheese, self-acting	XII.
	McClain Samuel—see Linhart & McClain.		
6023	Mellish, Henry	Braces, body	XX.
	Melvin, Thomas M.—see Pedrick and Melvin.		
6957	Meritt, Isaac	Gates, folding	IX.
—	Merrick, Solyman	Wrenches, screw	Extension.
	Merrick, Solyman—see Bartholomew and Merrick.		
	Merrill, Mead—see Hunter and Merrill.		
6264	Merritt, Frederick S.	Ranges, cooking	V.
6898	Merryman, Elias H.	Butter-working machines	I.
6282	Meyer, Conrad	Piano-fortes, elevating the tops of	XVIII.
6698	Miles, C. M.	Engines, method of reversing reacting rotary	VI.
6810	Miller, Benjamin F.	Stairs, construction of iron	IX.
6630	Miller, Henry	Bedstead fastenings	XVII.
134	Miller, Hezekiah S.	**Felt fabrics, &c., machinery for making**	**Re-issue.**

Number.	Patentees.	Inventions or Discoveries.	Class.
6050	Miller, Jacob C.	Planters, seed	I.
	Millington, Norman—see George and Millington.		
6139	Minesinger, David	Fire-arms, detached metallic cartridge tube, &c., for	XIX.
	Minkler, Simeon—see Pollard and Minkler.		
	Minturn, Charles—see Watson and Cart.		
6413	Mix, William	Spoons, method of making wire-strengthened	II.
6974	Moat, William C.	Pistons and stuffing boxes, tubular packing for	VI.
6734	Moffitt, Alexander	Winnowing machines, motion of riddles in	I.
	Monroe, James—see Frost and Monroe.		
6113	Montgilion, Louis	Railroads, apparatus for removing animals from	IX.
6445	Montgomery, William, assignor to Wm. Montgomery and George H. Williams	Rope yarns, tarring	III.
6036	Moore, Emery N.	Post marking letters, &c., machinery for	XXII.
	Moore, Luther Henry—see Adams and Moore.		
6099	Morey, Charles, and Joseph B. Johnson	Sewing machines	III.
6176	Morison, Benjamin	Rope machinery	III.
6549	Morris, Edmund	Door holder	II.
6725	Morrison, Enoch R.	Shingles, machinery for riving and dressing	XIV.
	Morrison, J. and A.—see Abram Haney.		
	Morrison and Tibbits—see Abram Haney.		
6420	Morse, Samuel F. B.	Telegraphs, electric	VIII.
6530	Mott, Jordan L.	Stoves, cooking	V.
	Mott, Jordan L.	Stoves	Extension.
6940	Moulton, John	Bedstead fastenings	XVII.
	Mower, Samuel—see Woodworth and Mower.		
6419	Mowry, Charles	Staves, machinery for jointing and cutting	XIV.
	Mowry, James D.—see Amos W. Snow.		
6975	Moyer, J. W.	Trucks, railroad	X.
6128	Mulbury, James	Valves, short slide, by chamfering the corners	VI.
6621	Mulhern, Justin	Water, &c., apparatus for filtering	XI.
6526	Mumma, Jacob	Corn shellers	XIII.
6885	Mumma, Jacob	Drills, seed	I.
6941	Munden, Isaac	Hubs, machinery for preparing for boxes	X.
6707	Munger, Asa, and Royal C. Taylor	Knives, machine for polishing	XVII.
6639	Munson, Edmund	Mill stones, forming and balancing	XIII.
5995	Munson, R. D.	Hubs and axles, attaching and detaching	X.
6426	Munson, Sylvester, and William H. Pratt	Washing machines	XVII.
6133	Murdock, Charles	Churns	I.
6523	Murdock, Reuben	Barrel machinery	XIV.
6633	Murphy, John	Wheels, car, method of regulating the contraction of	X.
6924	Murray, George E.	Teeth, making artificial	XX.
6112	Muzzy, Jacob	Saw-set, nipper	XIV.
6542	Myers, Emanuel	Planters, seed	I.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6159	Myers, Jeremiah	Looms, let off motion of	III.
	Mynderse, Edward—see Birdsill Holly.		
6193	Myrick, Freeman F.	Water wheels, tide	XI.
6065	Nettleton, Alpheus	Cars, dumping	X.
	Nichols, Eli B.—see Marsh and Nichols.		
6665	Nichols, John C.	Tables, dining	XVII.
6942	Nichols, William E.	Cord, machinery for making	III.
6636	Niles, Peter H.	Lock, eccentric piano	II.
6374	Norris, Curtis E.	Bobbins, machinery for boring	III.
6943	North, Gibson	Boilers, tin, for cooking stoves with cast iron bottoms, making	V.
	North, Harrison & Co.—see Samuel W. Gibbs.		
	Norton, Benjamin R.—see Hotchkiss and Norton.		
	Norton, Horace—see Moses S. Salter.		
6137	Norton, James L.	Stoves, cooking	V.
6015	Norton, Presbery and Franklin D. Cottle	Saws, machine for filing	XIV.
6732	Nowell, Foster	Spinning jack	III.
	Noyes, Charles W.—see Allen and Noyes.		
	Noyes, William C.—see Thomas G. Boone.		
6372	O'Conner, William, administrator of the estate of Henri Meneau de Villeneuve, deceased	Wool, producing a substitute for, from jute	III.
6362	Olmstead, Adolphus	Galvanic batteries	VIII.
6686	O'Neil, Patrick	Mattresses, spring	XVII.
6011	Osgood, Enoch	Tooth extractors	XX.
6265	Ostrander Jonathan F.	Bullets or pills, machine for spherifying	XIX.
6225	Otis, Benjamin H.	Presses, cheese, self-acting	XII.
6546	Owen, Benson	Stoves, self-regulating dampers for	V.
6944	Owen, J. Parsons	Bedstead fastenings	XVII.
6696	Page, Lewis B.	Fastener, sash, eccentric	II.
6752	Paine, Henry M.	Copying presses, portable	XVIII.
6536	Palmer, Aaron	Drills, grain	I.
6122	Palmer, Benjamin F.	Legs, artificial	XX.
6055	Park, Jesse K. and Cornelius S. Watson, assignors to William W. Rose	Envelopes, machines for making	XVIII.
6239	Parker, Granville	Steamboat, canal	VII.
6551	Parker, Warren	Rakes, horse, harness adapted to	I.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6062	Paraes, Alexander	Ores, reduction of	II
6043	Parkhurst, Stephen R.	Cards, &c., cylinders for carrying and supporting	III
6703	Parkhurst, Stephen R.	Gins, cotton	III
	Parry, Edwin—see Martin and Parry.		
6308	Parry, Harrison	Gold washer, rotary	II.
6805	Parry, John C.	Casting chilled rolls, method of giving a rotary motion to the melted iron in	II.
6016	Partridge, B. F.	Planters, corn	I.
6260	Pasco, Sardius and Elihu Perry	Boot crimps	XVI.
6914	Patch, John	Propellers	VII.
6550	Patten, Joseph H.	Drying grain	V.
6958	Patterson, Robert	Flax and hemp, manufacture of	III.
6271	Pease, Dan, Jr	Hulling machines	I.
6289	Pease, Dan, Jr	Hulling machines	I.
153	Pease, Francis S.	Harvesting machines	Re-issue.
	Pease, Keeney and Gage—see W. L. Sanderson.		
6925	Pecare, Jacob and Josiah M. Smith	Fire-arms, concealed trigger for	XIX.
6392	Peck, Charles H. and Coleman Hicks	Planing machines	XIV.
209	Peck, N. P.	Stoves	Design.
6084	Pedrick, William and Thomas M. Melvin	Hemp, machinery for spinning	III.
6088	Peeler, Henry	Gun barrels, method of boring	XIX.
6976	Peirson, Jacob	Planters, seed	I.
6059	Pelton, A. S.	Hinge, combined, fastener and shutter opener	II.
149	Pennock, Moses and Samuel	Seed planters	Re-issue.
6561	Perkins, Thatcher, assignor to Levi B. Tyng	Boilers and water-heaters of locomotive engines	VI.
6480	Perley, Charles	Winch, direct and counter motion	XII.
6509	Perley, Charles, and Joshua Terry	Shank painter stopper	VII.
6873	Perley, Charles	Windlasses, method of fitting the heaving socket and head of	XII.
6945	Perry, Alonzo D.	Guns, faucet breech	XIX.
	Perry, Elihu—see Pasco and Perry.		
6618	Peters, William	Carpets, machines to beat and brush	XVII.
6580	Philips, David	Sawmills, circular	XIV.
6145	Pierce, Amaria	Gas apparatus	V.
	Pierce, John—see McCleary and Pierce.		
6517	Platt, Nelson	Harvesters	I.
	Poinier, J. W.—see Moses S. Salter.		
6224	Polhameus, Abraham G.	Saddle and winch, combination of adjustable	VII.
6385	Pollard, Abiathar, and Simeon Minkler	Supporters, obstetrical	XX.
6654	Pomeroy, Elisha M.	Buttons, manufacture of, from straw-board	XXI.
243	Pond, Moses	Stove, air-tight	Design.
	Poole, Henry W.—see Alley and Poole.		
6850	Pope, Charles	Hames, harness	XVI.
6217	Porter, Robert D.	Tuyeres, conical valve in	II.

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS
6589	Porter, Rufus, assignor to Richard Van Dyke, Jr.	Engines, auxiliary, arrangement and method of working the valves of, for feeding boilers	VI.
6453	Post, Jacob	Lock for fire-arms	XIX.
	Pouley, William—see Rhoades and Pouley.		
6436	Powers, Rufus	Lumber, machinery for working into irregular forms	XIV.
6926	Powell, Samuel W	Mills for grinding	XIII.
6215	Pratt, Daniel R.	Springs for carriages, &c	X.
6149	Pratt, Elijah, and Raymond Graverend	Telegraph wires, suspending	IX.
	Pratt, Julius H.—see Bush and Pratt.		
6647	Pratt, Samuel	Metallic plates, method of uniting to each other	II.
6168	Pratt, T. W.	Spark arrester, horizontal	VI.
	Pratt, William H.—see Munson and Pratt.		
6356	Prescott, Joseph W., assignor to A. and A. J. Prescott	Musical instruments	XVIII.
	Pringle, Jacob and John—see James Cox.		
6781	Pritchett, Jacob	Ore washers	II.
6360	Prosser, Thomas	Boilers, tool for attaching tubes to	VI.
6421	Prouty, David O., and Ezra Whitman	Corn-shellers	XIII.
6476	Purviance, Alfred J.	Harvesting machines	I.
6184	Pye, Sylvester M.	Lock, door	II.
	Quackenboss, Augustus—see Samuel W. Gibbs.		
6163	Quinn, Henry	Drying grain	V.
6129	Race, Washburn, assignor to L. S. Bacon	Stoves, self-acting registers for	V.
	Race, Washburn—see Birdsill Holley.		
6331	Radebaugh, John, and John A. Matlack	Hair, machinery for cleaning	III.
220	Ransom, Samuel H.	Stoves	Design.
224	Ransom, Samuel H.	Stoves	Design.
225	Ransom, Samuel H	Stoves	Design.
245	Rathbone, John F.	Stoves	Design.
246	Rathbone, John F.	Stoves	Design.
247	Rathbone, John F.	Stoves	Design.
6808	Ray, Elias M.	Latch bolt, spring	II.
6231	Ray, Fowler M.	Springs, caoutchouc	X.
6714	Read, John B.	Pumps for raising water	XI.
6048	Read, Philip Pitts	Ox-shoe machine roller, with moveable dies	II.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS
6455	Reed, Cheney	Fastening and moving window blinds, method of	II.
6748	Reed, Cheney, and Elias Howe, Jr	Blinds, apparatus for opening and closing	II.
6507	Reed, Jesse	Steering apparatus	VII.
6395	Reed, Knight	Sugar, boiling	IV.
6138	Reichert, Henry	Fences, flood	IX.
	Reynolds, Edward	Felloes, &c., bending for carriage wheels	Extension.
6797	Reynolds, Joseph	Looms for figured fabrics	III.
6472	Rhoades, Jeremiah, and William Pouley	Saddles, spring	XVI.
6835	Rice, Orrin	Wash-boards	XVII.
6611	Rich, John	Ploughs	I.
6250	Richards, J. Avery, and John W. Wolcott	Diving bells, deep sea	VII.
	Richards, Nathan and Davis—see George and Brown.		
6319	Richardson, Israel J.	Straw-cutters	I.
6320	Richardson, Israel J.	Corn-shellers	XIII.
6232	Richardson, Israel J.	Threshing and grain-separating machines	I.
	Richardson, William and John—see Walter Hunt.		
231	Richmond, Apollos, assignor to A. C. Barstow & Co.	Grate, portable	Design.
6007	Richter, William	Ploughs	I.
6317	Riley, George	Distilling apparatus	IV
	Ring, Elkanah, Jr., and Thomas Ring—see Patrick Bryant.		
6510	Ripley, Ezra	Chills for casting rasps, files, &c	II.
6669	Ripley, Edwin G., administrator of the estate of Edwin Wesson	Fire-arm, method of connecting the hammer with the cylinder of a revolving	XIX.
6252	Ritchie, Henry, assignor to Henry C. Jones	Locks, bank	II.
6555	Ritchie, Henry, assignor to Henry C. Jones	Lock, rotating permutation plate	II.
6553	Robb, Daniel	Ploughs, hill-side	I.
6689	Robbins, Horace T.	Brakes for railroad cars	X.
6556	Robbins, Zenas C.	Churns	I.
6629	Robinson, Jonathan H	Pessaries	XX.
6893	Robson, John A.	Bedsteads, sofa	XVII.
6082	Roebling, John A.	Wire ropes, tops for	II.
6481	Rogers, Charles	Shoes, machines for cutting welts for	XVI.
6037	Rogers, David B.	Cultivators	I
6901	Rogers, John F.	Trucks, railroad	X
6761	Rogers, S. W.	Valve, foot, of steam engines	VI.
	Roggen, John Jay—see Livingston, Roggen, and Adams.		
	Roggen, John Jay—see Livingston, Roggen, Adams, Kendall, and Vail.		
6347	Rollf, Robert B.	Fasteners, curvilinear, blind opener and shutter	II.
6715	Rollhaus, Philip	Ranges, cooking	V.
6349	Roney, B. T.	Stoves, cooking	V.
	Root, F. H.—see Jewett and Root.		

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6482	Ropes, David N.	Cutlery, table, method of attaching the tang to the handle of.	XVII.
	Rose, William W.—see Park and Watson.		
6616	Ross, James P.	Steam engine, rotary, valves of.	VI.
6743	Ross, James P.	Planters, seed.	I.
5997	Ross, Joseph.	Bridge, swinging.	IX.
6836	Ross, William A.	Sails, means for working.	VII.
6127	Roth, Valentine.	Brick-presses.	XV.
6072	Ruggles, James	Vinegar, manufacture of.	IV.
6468	Ruthven, Morris W.	Propelling vessels by reaction.	VII.
6190	Sabin, Harvey W. and Luther B. Benton.	Water-buckets, apparatus for raising and tilting	XI.
6946	Sabin, Harvey W.	Water; apparatus for drawing from wells.	XI.
6947	Safford, Albert G.	Car couplings, self-acting.	X.
6886	Salter, Moses S. assignor to Moses S. Salter, Horace Norton and J. W. Poinier.	Iron, malleable, process for making direct from the ore.	II.
6852	Sampson, Elnathan.	Balances, pendulum.	XII.
6887	Sampson, Elnathan, and A. M. Billings.	Hubs, connecting with axles	X.
6275	Sanborn, John D.	Bedstead fastenings.	XVII.
128	Sanburn, Abraham.	Bee-hives.	Re-issue.
6545	Sanders, Benjamin D.	Winnowing machines.	I.
230	Sanderson, William L. assignor to Pease, Keeney and Gage.	Stoves.	Design.
255	Sanderson, William L. assignor to Dunham, Coller and Sage.	Stoves.	Design.
6221	Sanford, Nathaniel C.	Auger, combined convex and concave.	XIV.
6305	Sanford, Nathaniel C. and Lucius B. Smith.	Augers, screw, machine for regulating the twist and diameter of	XIV.
6570	Sanger, Ebenezer C.	Mules, self-acting regulators for.	III.
6959	Sangster, Hugh	Lanterns, signal.	V.
6778	Sargent, Charles G.	Burring cylinders.	III.
6200	Satterlee, Edward.	Metals, process for burnishing.	II.
239	Savery, William.	Stoves.	Design.
6474	Sawyer, David.	Scythe nibs.	I.
	Sawyer, Matthias P. and John W. Hall—see Samuel A. Cox.		
6874	Sawyer, Sylvanus	Rattans, machinery for splitting and dressing.	XXII.
6311	Scarlett, William.	Buckles, suspender, machine for making	XXI.
6053	Schnebly, William and Thomas.	Boat, life, self-inflating and folding.	VII.
6697	Schomacker, J. H. and Martin Kuemerle.	Books, machines for turning the leaves of.	XVIII.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6327	Schwartz, Theodore.	Paris green, manufacture of.	IV
6900	Scoffern, John.	Sugar, processes for the manufacture of	IV
6279	Scofield, Lewis, and Edward Cooper.	Furnaces, puddling and re-heating, combination of ash-trap with	II
6817	Scott, Elhanan W.	Saw-set, circular.	XIV
6694	Scott, George, assignor to D. O. Ketchum.	Glass pipes, moulds for making.	XV.
6506	Scott, James.	Sundials.	VIII
6414	Scowden, Theodore R.	Water main s, valve seats, &c. for	XI
6449	Scudder, Charles K.	Chimney caps.	V.
6132	Secor, James.	Current wheels, apparatus for.	XI
6581	Seely, Samuel J.	Life-preserving hammock, arrangement of the sections in a.	VII
6563	Serrell, James E. and David Smith.	Press, centripetal.	XII.
6104	Sewell, William Jr.	Boilers, steam, apparatus for ascertaining by inspection the saltness of water in.	VI
6788	Seyler, Benjamin.	Ploughs.	I
6171	Seymour, Alfred B.	Rail-road bar, combined.	IX.
6750	Seymour, Pierpont.	Drills, grain, devices for sowing seed in	I.
6470	Seymour, William H.	Staves, machines for jointing.	XIV
6960	Sharps, Christian.	Fire-arms, method of revolving the hammer of repeating.	XIX
6246	Shaw, Jacob Jr.	Spectacle frames.	VIII.
6095	Shaw, Philander.	Boot-heels, cutting.	XVI
	Shaw, William B.—see Hartshorne and Shaw.		
256	Shaw, William F.	Girandoles.	Design.
6404	Shaw, William M. and Ezra Gould, Gould assignor to Shaw.	Printing paper hangings.	XVIII.
6877	Sheldon, John.	Chronometers for longitude.	VIII
6339	Sheldon, Job, and John S. Barden.	Planing machines.	XIV
6912	Shepard, Timothy.	Barrel heads, machinery for dressing.	XIV.
6557	Sherborne, Thomas P.	Tables, extension.	XVII.
6032	Sheriff, John.	Cocks, stop, for hot water and steam.	XI.
6853	Sherman, John W.	Planters, seed.	I
6156	Shields, James, and James Cole.	Stoves for heating apartments.	V.
6284	Shipton, Thomas N.	Threshing machines	I
6894	Sibert, Lorenzo.	Furnace, blast, combination of a double travelling hearth with a.	II.
6624	Sickel, Horatio G.	Lamps, gas.	V
	Silsby, Horace C.—see Birdsill Holly.		
6020	Sinclear, Heman B.	Ploughs.	I
6310	Singer, Isaac M.	Carving wood or metal, machine for.	XIV
6875	Slawson, Charles.	Leather dressing machines.	XVI
6228	Small, Johnston	Corn-shellers	XIII
6854	Smart, John M.	Axles, grease boxes for.	X
6405	Smith, Abijah, assignor to Gilead A. Smith.	Trusses.	XX
6346	Smith, Alpheus D.	Ram, water	XI
6888	Smith, Augustine.	Hemp-brakes.	III.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6124	Smith, Daniel	Rifles, attachment of loading muzzle for	XIX.
6460	Smith, David	Shot, drop, method of manufacturing	XIX.
	Smith, David—see Serrell and Smith.		
6272	Smith, David M	Lock, bank	II.
6896	Smith, Edward N. assignor to James H. Gray	Paper, machines for folding	XVIII.
6452	Smith, Homer	Grain separators	I.
6343	Smith, Hezekiah B	Mortising machines	XIV.
6248	Smith, Jesper	Water-wheels, re-action	XI.
6247	Smith, J. Cutts	Baby-tenders, locomotive	XVII.
	Smith, Josiah M.—see Pecare and Smith.		
6488	Smith, Lorenzo	Gates	IX.
	Smith, Lucius B.—see Sanford and Smith.		
6795	Smith, Newman W	Accoucheurs' chairs	XX.
6682	Smith, Robert	Saddles, spring seat	XVI.
6837	Smith, Robert, and Alexander Bain	Telegraphs, electro-chemical	VIII.
6300	Snell, William	Boots, machines for cutting gaiter	XVI.
6552	Snow, Amos W. assignor to James D. Mowry and P. L. Hyde.	Cars, rail-road, seats for	X.
	Snyder, John D.—see Johnston and Snyder.		
6212	Solliday, Daniel H	Gas burners	V.
6075	Sourbeer, John	Fences, flood	IX.
6720	Sours, William	Stoves, cooking	V.
6851	Southworth, D. H., and James R. Hitchcock	Hullers, rice	I.
6199	Spangenberg, John	Sugars, draining and blanching	IV.
6219	Spangenberg, John	Clarification of cane juices	IV.
	Sparkman, James D.—see William Berry.		
6249	Spring, Charles A., and William H. Derick	Planing machines	XIV.
6605	Springsteed, R. H.	Planters, seed	I.
6179	Sprouse, William T	Ploughs	I.
6807	Stafford, James R	Stoves, cooking	V.
6009	Stanley, John B	Pea vines, machines for gathering	I.
6961	Stanton, Henry	Churn dashers	I.
6363	Starr, Eben T	Boats, flexible, divisions between the tubes of	VII.
6098	Start, William H	Wagons, dumping	X.
6497	Steacy, Edward	Drills, grain	I.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6567	Stedman, Benjamin S	Veneers, machines for cutting from cylindrical blocks	XIV.
6126	Steele, J. Dutton	Bridges, method of attaching the arch to the truss frame in	IX.
6080	Stephenson, William	Stoves, cooking	V.
6765	Stewart, William B	Wash-boards, machines for making	XVII.
6519	Stillman, Alfred	Sugar, boiling, steam pipes for	IV.
6671	Stillman, Alfred	Sugar pans	IV.
6150	Stinehart, William, and John Taggart	Brakes for cars	X.
6927	Stiven, Alexander	Pumps for raising water	XI.
6296	Stockwell, Lewis	Shingles, machinery for dressing	XIV.
6483	Stotlemeyer, Devolt	Bedstead fastenings	XVII.
6767	Stow, Dennis S	Sawing, mitre, machinery for	XIV.
6597	Straub, Abraham	Winnowing machines	I.
6562	Stroop, Jacob	Ploughs, attachment of harrows to	I.
6587	Stroop, Jacob	Fastener, window shutter	II.
6243	Sturgis, John J	Type-casting machines	XVIII.
6838	Sullivan, Jonathan	Straw-cutters	I.
6656	Swain, Benjamin O	Planetariums	VIII.
6889	Swan, Richard, Jr	Piano-fortes, sounding boards for	XVIII.
6906	Sweeney, Peter	Pumps, rotary	XI.
6600	Swett, Samuel	Spark arresters, deflectors for	VI.
6783	Tabele, William	Bandboxes, manufacture of	XXI.
6052	Taft, Andrew B	Hinge and spring, combined double	II.
	Taggart, John—see Stinehart and Taggart.		
6525	Taplin, John A	Horse powers, construction of the master wheel of	XIII.
6859	Tarr, John B	Engines, fire	XI.
	Tay, Aaron—see George and Brown.		
	Taylor, Fowler P.—see Joseph W. Briggs.		
6687	Taylor, James	Bedstead fastenings	XVII.
	Taylor, Royal C.—see Munger and Taylor.		
	Terry, Joshua—see Perley and Terry.		
6640	Tewksbury, George P	Boat, life, reversible	VII.
6596	Thatcher, Thomas	Pump valves, and their arrangement	XI.
6554	Thomas, James	Trap, animal, adjustable platform	XXII.
6717	Thomas, James	Brooms, machine for making	XVII.
135	Thomas, John	Docks, floating dry	Re-issue.
6839	Thomas, William S	Springs for carriages	X.
6962	Thompson, Henry G	Engines, rotary, valve motion cut-off, and steam stops	VI.
6667	Throckmorton, Reid R	Planing machines	XIV.
6677	Thurman, John W	Ploughs, hill-side	I.
148	Thurston, John	Winnowing machines	Re-issue.
6205	Tiffany, Oliver	Furnaces, air-heating	V.
6154	Tilden, Richard S	Punching machine, with a combination of adjustable gauge s	II.

ALPHABETICAL LIST—Continued.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
	Tillinghast, Joseph B.—see Gill and Tillinghast.		
6285	Titcomb, Stephen	Bee-hives	I.
6590	Tisdale, Charles R., James Keane and Thomas Keane, James and Thomas Keane, assignors to Charles R. Tisdale	Cotton, machinery for spinning	III.
6477	Todd, Hiram	Buckles for harness	XVI.
6751	Torrey, Ambrose	Waste gate or sluice, self-acting	IX.
6318	Touchstone, James, and Jacob H. Clark	Pistons, metallic, method of expanding	VI.
6643	Townsend, Benjamin M.	Road scrapers	IX.
	Townsend, Benjamin M.—see Woodruff and Townsend.		
6398	Toy, Joseph M. assignor to David Bonnor	Sawing wood, machinery for	XIV.
132	Trapp, William Jr.	Barrel machinery	Re-issue.
6273	Treadwell, Leverett	Brakes for rail-road cars	X.
6021	Treadwell, William B.	Wheels, cast iron car	X.
6115	Trees, James	Water wheels	XI.
6359	Tremper, John	Piston ring, and method of deriving motion therefrom in rotary engines	VI.
6030	Truscott, Samuel	Wheels, cast iron car	X.
6890	Tucker John E.	Welt-cutting and splitting machines	XVI.
6678	Tupper, Lewis	Straw-cutters	I.
6091	Tuthill, Thomas J.	Ploughs, rotary cutter	I.
6060 & 136	Tuttle, Charles F.	Furnaces, registers for hot air	V. & Re-issue.
6708	Tuttle, Charles F.	Furnaces, registers for hot air	V.
6840	Tuttle, John L.	Cylinders, toothed, mode of making	III.
6632	Twitchell, Willard	Gates, arrangement of weight and pulley for closing	IX.
6066 & 141	Tyer, H. G. and John Helm	India-rubber, manufacture of	IV. & Re-issue.
	Tyler, David—see McKinney and Tyler.		
	Tyng, Levi B.—see Thatcher Perkins.		
	Vail, Alfred—see Livingston, Roggen, Adams, Kendall and Vail.		
6218	Van Anden, William	Screw cutting machine, feeder and nippers for	II.
6634	Van Anden, William	Springs, spiral, machine for making of wire	II.
6357	Van Bunschoten, Isaac, John J. Woodbridge and William E. Mann; Woodbridge and Mann, assignors to Van Bunschoten	Daguerreotype apparatus for panoramic views	XVIII.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
[illegible]	[illegible]	Wheels, cast iron car	X.
6841	Van Ness, William J.	Callipers, transverse	I.
6928	Van Riper, Garret	Hemp, machinery for spinning	VIII.
6948	Vaughan, David	Staves, machinery for jointing	III.
6949	Vaughan, Joseph Jr.	Tools, machine for grinding and polishing	XIV.
6929	Verdat du, Trembley, Jean Baptiste Louis Prosper	Engines, vapor, condensers and stuffing boxes of	XIV.
	Villeneuve, Henri Meneau de—see William O'Conner.		IV.
6528	Von Heeringen, Ernest	Musical notation	XVIII.
6558	Von Heeringen, Ernest	Piano forte, instruments for teaching music with the	XVIII.
6791	Von Schmidt, Peter	Ore-washers	II.
	Vose, Samuel D.—see Bleecker and Vose.		
232	Wager, James	Stoves	Design.
233	Wager, James	Stoves	Design.
242	Wager, James	Stoves	Design.
6582	Waldran, William B. and Godfrey Hargitt	Brick presses	XV.
6626	Walker, Andrew, Jr.	Gas apparatus	V.
6644	Walker, Charles	Hullers, rice	I.
6208	Walker, Charles, and George Willson	Veneers, manufacture of paper	XIV.
6532	Walker, Daniel L.	Washing machines	XVII.
6705	Walley, Samuel S.	Pawls, jointed	XIII.
6977	Ward, Isaac B.	Wheels for carriages	X.
6713	Ward, William	Horse powers	XIII.
6177	Waring, George E.	Stoves, cooking	V.
217	Waring, George E.	Stoves	Design.
6008	Warner, Benjamin W.	Shears, tailors'	XXI.
6013	Warner, Chapman	Cores, moulding and compressing	II.
6428	Warner, Chapman	Pipes, lugs and links for connecting	XI.
6527	Warner, Chapman	Churns	I.
6515	Warner, George E.	Boom-derrick	XII.
6167	Warner, Jeremiah	Cultivators	I.
223	Warnich, Charles W.	Stoves	Design.
6620	Warren, Jesse	Ploughs	I.
6740	Warren, Thomas E.	Chairs, springs for	XVII.
	Washburn, Nathan—see Hart and Washburn.		
	Waterman, Ebenezer—see George and Brown.		
6978	Waterman, Nathaniel	Lanterns, portable	V.
	Watson, Cornelius S.—see Park and Watson, assignors to William W. Rose.		
6729	Watson, John, and Edward Cart, assignors to Albert Woodhull and Charles Minturn	Gas generators	IV.
6434	Watson, William	Grain, destroying weevil in	I.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6438	Weatherhead, David L.	Bolt machines, method of constructing and operating the header in	II.
6625	Webb, John G.	Lamps, gas, argand burners for	V.
6448	Webb, Joseph W. assignor to Benjamin Gould	Cut off and steam stop of rotary engines	VI.
6253	Webber, Elbridge, and Charles Hartshorn	Lasts, &c., machinery for turning	XVI.
6702	Webber, George	Can-hooks	XII.
6433	Webster, Francis M.	Bedsteads for invalids and others	XVII.
6619	Weed, Julius	Apples, paring, coring and slicing	XVII.
	Weeks, Ebenezer—see Crafts and Weeks.		
6350	Weeks, John J.	Mortising machines	XIV.
6541	Weishampel, John F.	Grates, coal, revolving horizontal	V.
	Welhelm, Charles—see Cornelius and Welhelm.		
6195	Wells, Thomas J. assignor to Daniel Barnum	Planing machines	XIV.
	Wells, Thomas J.—see Barnum and Wells.		
6855	Wentworth, Joseph	Carpet cleaning machine	XVII.
	Wesson, Edwin—see Edwin G. Ripley.		
6266	Wheaton, Milow S.	Dam or water weir, adjustable	IX.
6615	Wheeler, Asa	Metals, process of hardening	II.
6576	Wheeler, George	Bee-hives	I.
6719	Wheeler, William	Stoves, cooking	V.
6056	Whipple, John A.	Daguerreotype pictures, taking	XVIII.
140	Whipple, Milton D.	Wool, machine for cleaning from burs and other foreign matter and also for ginning cotton	Re-issue.
6911	Whipple, Milton D., assignor to The Bay State Mills	Fringe, shawl, machinery for twisting	III.
6381	Whistler, John	Lasts, shoe	XVI.
6666	White, Edwin B.	Spike machines, rotating	II.
6803	White, Edwin B.	Spike machine, double cylinder	II.
6081	White, James	Stoves, cooking	V.
6454	White, Jonathan	Straw-cutters	I.
6083	Whiteside, G. B.	Stoves, cooking	V.
6856	Whitham, James M.	Tailors' measures	XXI.
	Whitman, Ezra—see Prouty and Whitman.		
6118	Whitmarsh, Samuel	Warming apartments, apparatus for	V.
6645	Wilder, William S.	Ruling paper, machines for	XVIII.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS.
6484	Willcox, William H.	Boring machines	XIV.
6701	Williams, Abijah J.	Heddles, wire, machinery for making	III.
	Williams, George H.—see William Montgomery.		
6504 & 91	Willoughby, James D.	Planters, seed	I. and adt'l imp.
6857	Willoughby, James D.	Water, apparatus for raising and carrying	XI.
6950	Wills, Harry A.	Spike machines, operating the hammers of	II.
	Willson, George—see Walker and Willson.		
6287	Wilson, Charles	Stone, machines for dressing	XV.
6776	Wilson, Charles	Presses for cotton, &c., hydraulic	XII.
6487	Wilson, John	Looms	III.
6547	Wilson, Roswell	Stoves, cooking	V.
6203	Winegar, Caleb	Telegraphs, magnetic	VIII.
6306	Winne, Simon P.	Valve, sliding cut-off	VI.
6963	Winslow, Isaac	Bottle fasteners	XXII.
6930	Wiser, Hiram H.	Wheels, cast iron car	X.
	Wolcott, John W.—see Richards and Wolcott.		
	Wood, Simeon—see Beardsley and Wood.		
6345	Wood, Thomas R.	Coffee roaster	XVII.
	Woodbridge, John J.—see Van Bunschoten, Woodbridge and Mann.		
6235	Woodbury, Daniel	Grain separators	I.
6211	Woodbury, Joseph P.	Planing machines	XIV.
	Woodhull, Albert—see Watson and Cart.		
6858	Woodruff, Jerome B., and Benjamin M. Townsend	File supporter	XIV.
6427	Woods, Lucius B.	Railroad switch, self-acting	IX.
6394	Woodward, Francis G.	Railroad switches, method of fastening	IX.
6375	Woodward, Mary Ann	Chairs, fan rocking	XVII.
6899	Woodward, Arad 3d, and Samuel Mower	Brick presses	XV.
218	Woolson, Charles J.	Stoves	Design.
6931	Worster, Alvah	Buckle tongues, detachable	XVI.
6397	Worster, J. Rutherford	Diving bells	VII.
6274	Worthington, Henry R., and William H. Baker	Engines, method of insuring the action of the valves in the direct action pumping	VI.
6037	Wright, Alexander	Burring machines, guards or strippers for	III.
6031	Wright, Henry	Boot trees	XVI.
6216	Wright, John, assignor to Francis Leonard and Daniel Hughes	Lock, a, machine for turning on sheet metal	II.
6980	Wright, Lemuel W.	Rotting hemp and other fibrous materials, apparatus and process for	IV.
6146	Wright, William	Pistons, metallic packing for	VI.
6711	Wright, William M.	Churn-dashers, atmospheric	I.

ALPHABETICAL LIST—CONTINUED.

NUMBER.	PATENTEES.	INVENTIONS OR DISCOVERIES.	CLASS
6709	Würdemann, William	Parallatic instruments for measuring distances	VIII
6964	Wurfflein, Andrew	Lock, turning nipple and concealed hammer	XIX
	Wyckoff, Amos D.—see Hodgman and Wyckoff.		
6111	Yale, Linus	Lock, combination revolving tumbler	II
6214	Yerger, George W	Fractured or injured ankles, surgical apparatus for	XX
6602	Young, Samuel S	Calculating machines	VIII
6876	Zisemann, Ferdinand	Brick presses	XV

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TABLES:

EXHIBITING THE COMPARATIVE NUMBERS OF PATENTS, OF EACH CLASS, ISSUED TO CITIZENS OF THE SEVERAL STATES FOR EVERY TEN YEARS,

FROM 1790 TO JANUARY, 1850;

TO WHICH IS ADDED

A LIST OF PATENTS GRANTED TO FOREIGNERS DURING THE SAME PERIOD.

MAINE.*

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations			2	24	76	14
2	Metallurgy and manufactures of metals, and instruments therefor				7	10	7
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper			2	8	13	3
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.				3	7	3
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel		1		1	29	3
6	Steam and gas engines, including and boilers furnaces therefor, and parts thereof			1		4	1
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life preservers				3	7	6
8	Mathematical, philosophical and optical instruments, including clocks, chronometers					4	1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams and other internal improvements, buildings, roofs				2	5	1
10	Land conveyance, comprising, carriages, cars and other vehicles used on roads, and parts thereof				1	11	2
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids				3	24	6
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights				12	13	7
15	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers				12	20	8
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements				13	15	11
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials				15	16	1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness			1	1	10	3
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing		1	1	3	26	6
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry				1		
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder				4	3	
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus			1	1	3	1
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing				1	2	1
22	Miscellaneous				1	2	1
	Total		2	8	120	300	86

* Where patents have been granted to joint inventors residing in different states, the invention is accredited to the state first named in the official digest.

NEW HAMPSHIRE.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations	1	2	6	7	23	8
2	Metallurgy and manfactures of metals, and instruments therefor		3	4	3	16	6
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	1	2	13	5	11	10
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.	1	4	3		5	3
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel			5	4	25	3
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof	2	1	3	1	2	2
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers		1	3	1	2	1
8	Mathematical, philosophical and optical instruments, including clocks, chronometers			2			1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams and other internal improvements, buildings, roofs		2	2		2	6
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof	1		2	1	4	3
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids	3	1	3	2	11	7
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights		1			6	9
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers		2	2	1	8	2
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements			5	3	41	11
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials			1	1	1	2
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness		2	4	4	6	1
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing	1	2		3	7	5
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry			1		1	4
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder		1	2	1	2	
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus			2			6
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing					2	1
22	Miscellaneous					1	2
	Total	10	24	63	37	176	93

VERMONT.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations	2	2	5	11	20	14
2	Metallurgy and manufactures of metals, and instruments therefor	1	1	3	5	8	12
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	1	2	12	5	22	21
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c	2	1	3	3	2	
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparing of fuel	1		3	6	12	15
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof				2		6
7	Navigation and maritime instruments, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers				1		3
8	Mathematical, philosophical and optical instruments, including clocks, chronometers			1	3	3	
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs			3	1		1
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof		1		3	6	4
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids	2	2	2	5	4	4
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights		1	4		14	8
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers		1	1	1	7	7
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements		3	3	5	8	16
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials		1	1	2	2	3
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness		2	3	1	10	3
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing			1	3	5	
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry			4	2	2	1
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder					5	
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus				2	2	2
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						1
22	Miscellaneous						
	Total	9	17	49	61	132	121

* 1 Design; 1 Re-issue.

MASSACHUSETTS.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations,	2	7	24	14	39	24
2	Metallurgy and manufacture of metals, and instruments therefor	7	22	54	27	82	88
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	5	11	58	66	123	137
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c	11	18	29	15	35	18
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel	3	10	27	17	74	96
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof	1	1	6	6	24	21
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers	3	2	17	20	29	25
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers		10	4	4	7	15
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs	5	8	4	9	13	33
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof		6	8	8	18	40
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids	3	12	34	17	34	24
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising and moving weights	1	6	8	3	12	10
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers	1	4	6	10	16	10
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements	2	13	19	30	52	49
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials	1	4	7	8	7	19
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness	2	14	18	15	47	32
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing	2	8	3	14	34	31
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry	1	3	11	14	29	47
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder		3	5	2	21	11
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus		2	1	1	5	21
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing		1	7	7	9	12
22	Miscellaneous				1	4	21
	Total	50	165	350	308	714	784

* Re issues, 13; designs, 13; renewals, 1; extensions, 1; additional improvements, 1.

RHODE ISLAND.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations				3	4	3
2	Metallurgy and manufacture of metals, and instruments therefor	1	1	1	3	7	12
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	2	1	24	27	37	15
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel		1	5	1	6	7
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof				4	2	7
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers		1		2		
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers				3	2	1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs		1	1	3	2	4
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof				3	1	1
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids	2	1	1	3	1	
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising and moving weights					1	3
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers			1		4	1
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements		1			5	
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness			1	1	2	
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing			1		2	3
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry		1	3	1	1	2
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder					1	1
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus				2	1	
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing		2	1	3		1
22	Miscellaneous						
	Total	5	10	39	59	79	61

* Re-issues, 1; designs, 2.

CONNECTICUT.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations		12	23	20	37	26
2	Metallurgy and manufactures of metals, and instruments therefor	8	9	15	11	43	59
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	1	12	38	28	56	30
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c	8	10	18	7	9	14
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel		6	14	3	66	20
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof			3	1	10	9
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers	2	4	3	5	7	6
8	Mathematical, philosophical and optical instruments, including clocks, chronometers	1	3	4	12	10	10
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs	1	2	2	11	6	9
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof		10	4	16	11	14
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids	2	9	6	9	9	8
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights		4	2	4	6	4
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers		7	9	5	18	9
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements		5	18	14	23	22
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials		3	1	1	2	1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness		1	7	4	17	4
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing	1	7	5	10	30	20
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry	2	3	6	6	5	9
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder			3	3	9	8
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus	1				3	12
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing	2	6	18	8	19	19
22	Miscellaneous	1			5	3	15
	Total	30	113	199	183	399	328

* Re-issues, 3; extension, 1; design, 1.

NEW YORK.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations		34	47	138	211	181
2	Metallurgy and manufactures of metals, and instruments therefor	3	21	30	55	133	176
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	4	20	86	130	78	95
4	Chemical processes, manufactures and compounds, including, medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.	4	29	65	68	114	77
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel	3	9	56	55	169	273
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof	1	4	20	44	63	118
7	Navigation and maratime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers	3	9	39	35	59	67
8	Mathematical, philosophical and optical instruments, including clocks, chronometers		1	7	5	22	35
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs		7	10	54	73	73
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof	1	4	17	23	58	62
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids	8	24	47	59	103	123
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights		10	14	18	44	43
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers	2	7	16	38	83	60
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements	3	8	22	58	141	95
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials	5	5	5	22	29	13
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness		2	13	17	44	62
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing	1	24	22	48	79	65
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry	1	5	19	30	48	71
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder		1	5	16	20	35
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus		2	4	14	22	46
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing		3	5	17	22	37
22	Miscellaneous	1	4	7	7	11	32
	Total	40	233	556	951	1,626	1,839

* Extended, 2; disclaimers, 4; re-issues, 27; designs, 101; renewals, 3; additional improvement, 1.

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PENNSYLVANIA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations	3	16	17	35	122	105
2	Metallurgy and manufactures of metals, and instruments therefor	8	4	32	17	64	96
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	8	10	29	26	37	27
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.	9	36	43	26	45	42
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel	7	10	21	28	43	83
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof		2	6	9	58	59
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers	9	5	14	7	36	31
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers	3	2	5	5	7	11
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs	2	2	7	14	35	38
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof		2	6	12	47	42
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids	5	15	23	22	31	40
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights		2	8	3	12	14
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers	4	6	20	7	44	33
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements		8	9	14	30	33
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials	2	1	8	10	26	22
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness	1	4	10	16	26	31
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing	1	6	13	16	31	30
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry		4	15	15	27	38
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder	1	4	5	6	10	9
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus	1	3	4	1	16	22
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing		1	11	8	12	15
22	Miscellaneous	1	1	1	3	8	18
	Total	65	144	307	300	767	839

* Additional improvements, 5; re-issues, 5; designs, 16; extension, 1.

NEW JERSEY.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1.	Agriculture, including instruments and operations	1	5	2	13	26	14
2.	Metallurgy and manufactures of metals, and instruments therefor	2	2	5	2	12	37
3.	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	3	3	11	10	13	26
4.	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.	1	6	9	7	7	8
5.	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel		3	2	4	9	15
6.	Steam and gas engines, including boilers and furnaces therefor, and parts thereof	2		8	3	4	15
7.	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers	1	4	8	3	3	6
8.	Mathematical, philosophical, and optical instruments, including clocks, chronometers		1	1	2	1	2
9.	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs			1	6	5	6
10.	Land conveyances, comprising carriages, cars, and other vehicles used on roads, and parts thereof		4	1	3	8	7
11.	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids	5	4	2		10	6
12.	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights			1	2	2	4
13.	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers		1	2	2	2	3
14.	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements	1		4	3	5	5
15.	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials	2		2	2	2	2
16.	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness		2		5	5	6
17.	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing		1	1	3	2	3
18.	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry	2		4	1	3	2
19.	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder			1	1	1	2
20.	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					3	5
21.	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing		1			4	9
22.	Miscellaneous		1	1		1	5
	Total	19	38	66	72	123	188

* Renewals, 2; re-issues, 4; design, 1.

DELAWARE.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1890 to 1800.	1810.	1820.	1830.	1840.	1850.
1.	Agriculture, including instruments and operations		1	1	2	5	4
2.	Metallurgy and manufactures of metals, and instruments therefor						4
3.	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	1	2				2
4.	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.		1		1		
5.	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel					1	
6.	Steam and gas engines, including boilers and furnaces therefor, and parts thereof					2	1
7.	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						1
8.	Mathematical, philosophical, and optical instruments, including clocks, chronometers					1	
9.	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs				1	1	1
10.	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof			6		2	3
11.	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids				1		
12.	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights					1	
13.	Grinding mills and mill gearing, containing grain mills, mechanical movements, and horse powers		1		1	2	4
14.	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						
15.	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials				1		
16.	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness				1		3
17.	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing					3	
18.	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19.	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder		1	1			
20.	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21.	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22.	Miscellaneous						1
	Total	1	6	8	8	18	24

MARYLAND.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations		6	17	8	35	23
2	Metallurgy and manufactures of metals, and instruments therefor	2	5	11	2	9	10
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	1	3	7	2	8	12
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.		6	16	6	9	11
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel	1	2	13	13	16	15
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof	1		5	5	21	30
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers		1	6	17	9	11
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers		2	1	4	1	4
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs	1	4	3	4	16	12
10	Land conveyances, comprising carriages, cars, and other vehicles used on roads, and parts thereof	1	1	2	11	32	13
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids	1	7	4	7	13	16
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights		1		2	4	5
13	Grinding mills and mill gearing, containing grain mills, mechanical movements, and horse powers	1	3	2	2	11	7
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements		2	8	2	5	7
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials		1	3	3	2	8
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness		1	6		8	7
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing		2	3	11	13	10
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry		1		2	7	5
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder			2	1	2	
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus	1	1	2	2	5	5
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing			2	5	4	3
22	Miscellaneous		1			4	4
	Total	10	50	115	109	234	218

* Extensions, 3; re-issue, 1; design, 1.

VIRGINIA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations	4	9	17	22	60	23
2	Metallurgy and manufactures of metals, and instruments therefor	1	7	3	5	8	8
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper		2	9	8	7	5
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.	3	4	16	5	11	4
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel		4	2	5	4	3
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof	2		2	1	4	2
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers		1	3	3	8	5
8	Mathematical, philosophical and optical instruments, including clocks, chronometers			2	3	4	1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs		2	3	5	14	4
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof				2	6	1
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids	1	1	8	14	12	4
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights		1	2	8	9	3
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers	2		6	3	10	15
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and cooper's implements			7	1	7	7
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials		2	3	3	4	1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness	1		2	6	17	2
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing		3	3	6	13	6
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry		1		2	1	
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder			4	3	3	
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus			2		2	3
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing				1		2
22	Miscellaneous				3	8	3
	Total	14	37	94	109	212	102

NORTH CAROLINA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations		1	2	7	12	11
2	Metallurgy and manufactures of metals, and instruments therefor				3	13	1
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper		3	3	2	1	1
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c		1	4	1		2
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof			2		4	
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers						
8	Mathematical, philosophical and optical instruments, including clocks, chronometers				1	1	
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs				1		
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof				1	1	1
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids				2		2
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights			1	6	1	
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers		1	2	15	1	1
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements			1	4	5	7
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness				1		
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing				1	9	2
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						2
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus				1		
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total		6	15	46	48	30

SOUTH CAROLINA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations	2	3	4	13	12	5
2	Metallurgy and manufactures of metals, and instruments therefor			1	3	2	4
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper		1				3
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.			2	1		2
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel	1	1				1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof				4	4	
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers			1	1	3	
8	Mathematical, philosophical and optical instruments, including clocks, chronometers		1	1			1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, wiers, dams, and other internal improvements, buildings, roofs				2	1	1
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof			2	2	3	2
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids		2	2		1	1
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights		1		4		3
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers		1		3	3	1
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements	1			2		
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials	1				2	1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						1
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing					1	
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry			1			1
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder				1	1	
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					2	1
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						2
22	Miscellaneous		1				
	Total	5	11	14	36	35	30

GEORGIA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations		1	1	1	3	4
2	Metallurgy and manufactures of metals, and instruments therefor					3	3
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	3	2		2	1	3
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.				3	2	
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel					1	
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof		1	1		2	1
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers				2	1	3
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs			1			2
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof					1	
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising or delivering fluids				2	2	
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising and moving weights				2	1	
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers			1	1	1	3
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements	1		1		2	1
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials				1		2
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness					1	1
17	Household furniture, machines and implements for household purposes, including washing machines, bread and cracker machines, feather dressing						2
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						1
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						1
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					2	1
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing					1	3
22	Miscellaneous					1	2
	Total	4	4	5	14	25	33

FLORIDA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations						
2	Metallurgy and manufactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs						
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising or delivering fluids						
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights						
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						1
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total						2

GEORGIA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations		1	1	1	3	4
2	Metallurgy and manufactures of metals, and instruments therefor					3	3
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper	3	2		2	1	3
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.				3	2	
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel					1	
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof		1	1		2	1
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers				2	1	3
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs			1			2
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof					1	
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising or delivering fluids				2	2	
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising and moving weights				2	1	
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers			1	1	1	3
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements	1		1		2	1
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials				1		2
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness					1	1
17	Household furniture, machines and implements for household purposes, including washing machines, bread and cracker machines, feather dressing						2
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						1
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						1
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					2	1
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing					1	3
22	Miscellaneous					1	2
	Total	4	4	5	14	25	33

FLORIDA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations						
2	Metallurgy and manufactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs						
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising or delivering fluids						
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights						
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						1
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total						2

OHIO.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations		1	1	15	63	75
2	Metallurgy and manufactures of metals, and instruments therefor				4	12	29
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper			4	15	9	22
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c		1	4	10	16	18
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparing of fuel				3	15	58
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof		1	3	9	12	17
7	Navigation and maritime instruments, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers			1	7	3	5
8	Mathematical, philosophical and optical instruments, including clocks, chronometers					4	10
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs				1	8	9
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof				1	5	15
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids		2	5	12	22	23
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights				4	3	21
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers			2	14	23	22
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements			1	3	32	38
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials				2	12	8
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness		1	1	6	13	19
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing			1	5	19	33
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry			1		6	3
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder				4	6	3
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					5	15
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing			1	1	3	5
22	Miscellaneous					1	3
	Total		6	25	116	292	451

* Designs, 15; additional improvements, 1; re-issues, 5.

MICHIGAN.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations						
2	Metallurgy and manufactures of metals, and instruments therefor					10	14
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						4
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel				1		1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof					1	3
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life preservers					3	1
8	Mathematical, philosophical and optical instruments, including clocks, chronometers				1		
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams and other internal improvements, buildings, roofs					1	
10	Land conveyance, comprising, carriages, cars and other vehicles used on roads, and parts thereof						2
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids						1
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights				1		3
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements					1	3
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials					1	8
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						1
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						1
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder				1		1
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					1	
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total				4	18	43

INDIANA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations				3	2	27
2	Metallurgy and manfactures of metals, and instruments therefor				1	3	3
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper				1	2	1
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c			1	1	1	1
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel				1	2	1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof					3	6
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers			1	1		1
8	Mathematical, philosophical and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams and other internal improvements, buildings, roofs				1	1	4
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof						1
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids		1	1	1	7	1
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights				2	2	2
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers			1	2	2	5
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements			1		7	9
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials						4
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness				1	2	2
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing					3	3
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						2
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder					1	1
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					1	2
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing				1		
22	Miscellaneous					1	
	Total		1	5	16	40	76

ILLINOIS.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations					2	29
2	Metallurgy and manufactures of metals, and instruments therefor					1	4
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						1
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c						3
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						5
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						1
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						2
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs					1	9
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof						4
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids					1	5
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising and moving weights						1
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers					2	4
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						6
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials					2	2
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						1
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						3
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						3
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						1
	Total					9	85

WISCONSIN.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations						3
2	Metallurgy and manufactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs						1
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids						1
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising and moving weights						1
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total						7

IOWA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations						
2	Metallurgy and manufactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						1
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						
8	Mathematical, phliosophical and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs						1
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids						1
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights						
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total						3

MISSOURI.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations					1	4
2	Metallurgy and manufactures of metals, and instruments therefor						1
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						
4	Chemical processes, manufactures and compounds, including, medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c				2		9
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						1
7	Navigation and maratime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						6
8	Mathematical, philosophical and optical instruments, including clocks, chronometers					1	
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs						1
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof					2	2
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids						2
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights					1	5
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers						1
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						1
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						2
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness					1	
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing				1		2
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry					1	1
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus				1		1
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						1
	Total				4	7	40

KENTUCKY.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1890 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations		2		1	17	9
2	Metallurgy and manufactures of metals, and instruments therefor		3			1	2
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper		1	8	9	13	4
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c			4	2	5	7
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel				2	2	1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof			3	3	3	1
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers		4		2	2	
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers				2	1	
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs					2	1
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof					1	1
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids		1	2	1	2	7
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights					5	1
13	Grinding mills and mill gearing, containing grain mills, mechanical movements, and horse powers		1		4	4	1
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements		2	2	2	2	3
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials				1	2	1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness			2	2	4	1
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing				2	8	7
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry		1		1		
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder		1			1	1
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus			1		6	4
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing				1		1
22	Miscellaneous						1
	Total		16	22	35	81	54

TENNESSEE.

CLASS	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations			1	1	22	8
2	Metallurgy and manufactures of metals, and instruments therefor					2	1
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper		2	2	1	6	4
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.	1		1	1	2	
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel				1	2	
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof				2	1	3
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers						1
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs				1	1	
10	Land conveyances, comprising carriages, cars, and other vehicles used on roads, and parts thereof					1	
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids			3	6	6	1
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights			1	1	3	4
13	Grinding mills and mill gearing, containing grain mills, mechanical movements, and horse powers				6	8	2
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements				2	3	4
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness			1	1	2	
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing					5	
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total	1	2	9	23	64	30

*Re-issue, 1.

ALABAMA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations				1	3	4
2	Metallurgy and manufactures of metals, and instruments therefor						3
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper				1	1	7
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.					1	2
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof					1	3
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers				1		1
8	Mathematical, philosophical and optical instruments, including clocks, chronometers						1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs				1	2	2
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof				1	1	2
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids					1	4
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights				2	2	3
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers				1	2	7
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and cooper's implements					1	2
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						4
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing					1	2
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						3
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						1
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					1	
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing				1		
22	Miscellaneous						
	Total				9	17	52

MISSISSIPPI.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations				2	2	6
2	Metallurgy and manufactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper				1	1	2
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.				1	2	1
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers				1		
8	Mathematical, philosophical and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs					1	
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids				1	1	
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights				1	6	1
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers					1	
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements			1			
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials					1	2
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						1
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						1
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total			1	7	15	14

ARKANSAS.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations						
2	Metallurgy and manufactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						
8	Mathematical, philosophical and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs						
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids						
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights						
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						1
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total						1

LOUISIANA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations					1	3
2	Metallurgy and manufactures of metals, and instruments therefor				1		1
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper			1		2	
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.			1		4	13
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel					2	1
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof			2	1		2
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers					1	1
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers				1		2
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs					4	6
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof					1	
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising or delivering fluids				1		5
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising and moving weights			1		1	7
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers				1	1	
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements				1		2
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials				4		
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness					1	1
17	Household furniture, machines and implements for household purposes, including washing machines, bread and cracker machines, feather dressing			1			1
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						3
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder					1	
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus					1	1
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						1
	Total			6	10	20	50

* Re-issues, 1; additional improvements, 1; designs, 1.

TEXAS.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations						
2	Metallurgy and manufactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.						1
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel						
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers						1
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs						
10	Land conveyance, comprising carriages, cars, and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids						
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights						
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						1
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials						1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						
	Total						4

DISTRICT OF COLUMBIA.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.
1	Agriculture, including instruments and operations		1	3	4	4	3
2	Metallurgy and manufactures of metals, and instruments therefor		1	5		3	6
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper		1	2	1		3
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c		2	4	4	5	4
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel			2	1	7	11
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof		1		4	5	4
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life-preservers		1	6	12	4	5
8	Mathematical, philosophical, and optical instruments, including clocks, chronometers			1	2	1	1
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs		3	1	4	5	3
10	Land conveyances, comprising carriages, cars, and other vehicles used on roads, and parts thereof		1	1	1	3	3
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids			5	1	2	2
12	Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights						
13	Grinding mills and mill gearing, containing grain mills, mechanical movements and horse powers			2	2	2	2
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements			2		1	6
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements, and other building materials		1	1	1	6	2
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness			1	1	1	2
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing		2	1	1	2	4
18	Arts—polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry			3	1	4	4
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder		2	5	1	3	7
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing				1		1
22	Miscellaneous					1	
	Total		16	45	42	59	73

FOREIGN.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.	1840.	1850.*
1	Agriculture, including instruments and operations					1	
2	Metallurgy and manufactures of metals, and instruments therefor	1			2	2	20
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper				1	7	17
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c					15	31
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel					4	6
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof				6	3	17
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging, and propulsion, diving dresses, life preservers				2	3	11
8	Mathematical, philosophical and optical instruments, including clocks, chronometers						8
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams and other internal improvements, buildings, roofs				1		4
10	Land conveyance, comprising, carriages, cars and other vehicles used on roads, and parts thereof						7
11	Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air or water, or employed in raising and delivering fluids				1		7
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights						
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers				1		2
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						2
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials						1
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness					1	2
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing				1		1
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry					3	12
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						5
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing			1	1		2
22	Miscellaneous						
	Total	1		1	16	39	155

*Extended, 1; re-issued, 1; additional improvement, 1. NOTE.—England, 130; Germany, 8; France, 26; Austria, 3; Prussia, 3; Russia, 2; Sweden, 6; Sandwich Islands, 1; Italy, 1.

AT LARGE.

CLASS.	INVENTIONS OR DISCOVERIES.	From 1790 to 1800.	1810.	1820.	1830.*	1840.	1850.
1	Agriculture, including instruments and operations						2
2	Metallurgy and manfactures of metals, and instruments therefor						
3	Manufactures of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper						
4	Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.						
5	Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel					1	3
6	Steam and gas engines, including boilers and furnaces therefor, and parts thereof						1
7	Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion, diving dresses, life-preservers				1		1
8	Mathematical, philosophical and optical instruments, including clocks, chronometers						
9	Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams and other internal improvements, buildings, roofs					3	
10	Land conveyance, comprising carriages, cars and other vehicles used on roads, and parts thereof						
11	Hydraulics and pneumatics, including water-wheels, wind-mills and other implements operated on by air or water, or employed in raising and delivering fluids						
12	Lever, screw and other mechanical power, as applied to pressing, weighing, raising and moving weights						
13	Grinding-mills and mill gearing, containing grain-mills, mechanical movements and horse powers						
14	Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing, mortising, shingle and stave, carpenters and coopers' implements						1
15	Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials						
16	Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness						
17	Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing						
18	Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry						
19	Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder						
20	Surgical and medical instruments, including trusses, dental instruments, bathing apparatus						
21	Wearing apparel, articles for the toilet, &c., including instruments for manufacturing						
22	Miscellaneous						1
	Total				1	4	9

* 8 patents date unknown.

II.

INVENTIONS AND CLAIMS

FOR THE YEAR 1849.

No. 5993.—*Improvement in Shower Baths.*

Having thus described the nature, construction and operation of the shower bath, as improved by me, I will now point out what I consider and claim as my invention therein, and desire to secure by letters patent.

I do not claim the jet bath, neither do I claim the moveable reservoir, both having been used separately before, but I do claim and desire to secure the combination of a moveable reservoir with a jet bath constructed as herein described. This combination I believe to be new and useful, and to have been made for the first time by myself. EPHR'M LARRABEE.

No. 5994.—*Combined Beading Tool and Circular Shears.*

What I claim as my invention, is the combination in one frame, constructed as described, of a set of cutting dies and one or more sets of beading or edging dies so applied together and to the frame as to permit of the easy insertion of the plates at the commencement of the cut or any part of it, and so that the plate or sheet of metal may be operated upon simultaneously by both beading and cutting dies, when the frame is revolved on its spindles.

J. F. FLANDERS.

No. 5995.—*Improvement in attaching and detaching Hubs and Axles.*

Having thus fully described my improved method of forming hubs of carriage wheels, and attaching them to axles, what I claim therein as new, and for which I desire to secure letters patent, is the employment of the solid cap and circular nut combined and arranged as herein described.

R. D. MUNSON.

No. 5996.—*Improvement in Journals and Boxes.*

Having thus fully described our improved anti-friction journals and their mode of operation, what we claim therein as new, and for which we desire to secure letters patent, is—first, supporting the box or journal upon the series of mitre grooved rollers or blocks working into similar grooves on the journal and bearing, said rollers being without journals, and the whole being constructed and arranged substantially in the manner and for the purposes set forth.

THOMAS HOPPER.
THOMAS GARRISON.

No. 5997.—*Improved Swinging Bridge.*

What I do claim as my invention, is a draw constructed of two or more parallel turning frames or timbers E F, and supported and made to operate with respect to the bridge substantially, as above specified.

JOSEPH ROSS.

No. 5998.—*Improvement in Combined Ploughs.*

What I claim as my invention and desire to secure by letters patent, is the construction of the removable land sides with wings, substantially as represented, in combination with shares made without either bosses, loops, or other projections upon the sides that would interfere with their being turned bottom side up, and attached to the shanks in that position, or obstruct their action when thus turned—the land sides and shares so constructed being connected together by one or more screw bolts, or by other analogous means.

ABNER LELAND.

No. 5999.—*Improvement in Ploughs.*

What I claim as my invention and desire to secure by letters patent, is the combination of the adjustable hinged and winged coulter *m*, with the mould board, land side and beam, the same being constructed and arranged substantially as herein described.

I also claim the combination of the auxiliary mould board *z*, with the principal mould board *d*, and adjustable coulter *m*, in the manner and for the purpose herein set forth.

JESSE LAYMAN.

No. 6000.—*Improvement in Turning.*

Having thus explained the nature of my invention, its construction and operation, I do not claim the combination of the saddle D, with the puppets, and chuck, and flange H H, merely to move crosswise on the lathe, but I claim the saddle D, constructed with a slot or slots, combined with pivots or screws, or swivels, and with another slot or slots in L L, the flange below, whereby the said pivots will act as centres or swivels for the saddle to be moved either transversely or set at any angle with the point of the cutter on the fixed spindle, so that when the box and chuck revolve around the cutter, and with the slide as it moves horizontally on the bed of the lathe, boxes for carriage and other wheels may be turned or rimmed out of any required interior taper, substantially as set forth.

ARUNAH S. MACOMBER.

No. 6001.—*Improvement in the manufacture of Lamp-black and Colophane.*

What I claim as my invention and desire to secure by letters patent, is the manufacture or production of lamp-black and colophane by one and the same process of decomposing rosin, substantially as described. I also claim as my invention in the apparatus above described for the manufacture or production of lamp-black and colophane, the combination of the lamp-black chamber and the colophane receiver with the retort, provided with the burners for inflammation, and the pipe for the delivery of the colophane, substantially as herein described. And, finally, I claim the hollow cylinder for the calcination of lamp-black in combination with the burners in the lamp-black chamber, substantially as described.

EDWARD CLARK.

No. 6002.—*Screw Wrench for grasping Cylindrical Forms*

What we claim in the above described wrench, and for the purpose of holding and turning cylindrical substances, is the combination of the lever D with the main bar of the wrench; also with the slide C, the nut B, and the spring E, substantially as herein described.

F. H. BARTHOLOMEW.
SOLYMAN MERRICK.

No. 6003.—*Method of bending Skelps, from which iron tubes are made.*

Having thus fully described my improvement, what I claim therein as new, and for which I desire to secure letters patent, is the mould constructed and arranged substantially as described, in combination with the finishing rollers of a common rolling mill.

JAMES M'CARTY.

No. 6004.—*Improvement in connecting Hubs and Axles.*

What I claim as my invention and desire to secure by letters patent, is the confining an axle or journal within a box, by means of a spherical ball or balls running in a channel made partly in the journal and partly in the box.

CHARLES CHINNOCK.

No. 6005.—*Machine for hook heading Spikes by one motion.*

What I claim as my invention and desire to secure by letters patent, is the combination of the carriage and punch holder, constructed substantially as described, with the roller or its mechanical equivalent as described, by means of which the spike is hook headed by a single motion.

JONATHAN BEARDSLEY.

No. 6006.—*Improvement in Musical Instruments.*

What we claim as our invention and desire to secure by letters patent, is the making and application of detached sheets, plates, or theorems, prepared by perforating, indenting, or otherwise adapting them to operate hammers, weights, keys, valves, levers, wires, or springs, to produce music or musical tones, using for the said sheets, plates, or theorems, any metal or material which will produce the intended effect. We also claim the right to hook or catch the ends of the said sheets, plates, or theorems together, so as to form an endless band if desired; and the right to use the above described gibs or cams D, springs M and L, moveable frame I, and rollers A and B, as arranged in the accompanying drawings; the said rollers prepared by grooving or otherwise adapting them to give motion to said sheets, plates, or theorems, for the purpose of producing music or musical tones by operating hammers, weights, keys, valves, levers, wires, or springs.

ADONIRAM F. HUNT.
JAMES S. BRADISH.

No. 6007.—*Improvement in Ploughs.*

What I claim as my invention and desire to secure by letters patent, is the corn fender C, in combination with the cultivator teeth A A, and the plough acting in the manner and for the purpose set forth.

WILLIAM RICHTER.

No. 6008.—*Improvement in Tailors' Shears.*

What I claim as my invention and desire to secure by letters patent, is the construction of the lower blade, separate from the upper lever, and connected with it by a joint, as above described. I also claim the application of the bar to steady the action of the lower blade, constructed and operating as herein described; and also the combination of the lower blade with the upper hand lever, in the mode of application described.

BENJAMIN W. WARNER.

No. 6009.—*Improvement in machines for gathering Pea Vines.*

What I claim herein as new and desire to secure by letters patent, is the mode of securing vines in a green state, by putting them up in hollow rolls, made as above described, and also the apparatus for the purpose of gathering vines and forming said rolls, as described in the above specification.

JOHN B. STANLEY.

No. 6010.—*Improvement in the manufacture of Hats.*

We claim the application of a solution of gutta percha, to the purposes of stiffening hat bodies, and uniting the plush or other cover to the body, as a substitute for shel-lac, glue-size and seed-lac, or other articles hitherto used for such purposes, as described.

ADRIAN BANCKER.
C. F. ALVORD.

No. 6011.—*Improvement in Tooth Extractors.*

What I claim as my invention and desire to secure by letters patent, is the compound fulcrum consisting of parts *g* and *d*, fig. 1, arranged and constructed in the manner and for the purpose described.

ENOCH OSGOOD.

No. 6012—*Improvement in painting Telegraph Wires.*

What I claim as my invention and desire to secure by letters patent, is the construction of an apparatus for aiding in the painting or coating of telegraph wires, (or for other purposes,) by the combination of rotating and stationary brushes and suspension pulleys, or their equivalents, with a portable receptacle for paint or other coating matter, substantially in the manner herein set forth. Not intending by this claim to limit myself to the particular form, number and arrangement of the parts composing the apparatus for aiding in the painting or coating of telegraph wires, as herein represented and described, but to vary the same as I may deem expedient, whilst I attain the same end by means substantially the same.

BENJAMIN H. GREEN.

No. 6013.—*Improvements in moulding and compressing Cores.*

What I claim as my invention and desire to secure by letters patent, is—1st. The improvement in the core tube (H,) caused by severing it by a longitudinal slit, for the purpose herein set forth. 2d. I claim the manner of compressing a coating of sand upon my improved core tube, or upon any core tube or rod, (or the formation of solid sand cores,) by means of sections operated by machinery substantially in the manner herein described; one of said sections being stationary, towards which another section is forced in a direction perpendicular to its plane; and the two other sections being forced towards each other, between the two first described, the whole of them arranged and operating substantially as herein described. 3d. In combination with the above mentioned core box sections, or any other analogous core-forming sections, I claim the (slightly elastic) core tube bearing plates J J, and caps *f f*, (or their equivalents,) substantially in the manner and for the purpose herein set forth. 4th. I claim the manner of compressing the sand into a half flask and giving it the impression of the pattern, by placing the pattern at the base of a forming box and covering it with sand, and then placing the half flask upon the sand covering the pattern and forcing it down upon the same by machinery, substantially as herein described. 5th. I also claim the manner of preserving the cores in a central position within the moulds, by means of concavo-convex skeleton or open stays (*a*,) formed of thin, narrow sheets of metal, and combined with a core and mould substantially in the manner herein represented and described.

CHAPMAN WARNER.

No. 6014.—*Improvement in Stop Motion for Drawing Frames.*

What I claim as my invention and desire to secure by letters patent, is the method substantially, as herein described, of stopping the operation of drawing frame or drawing heads by means of guides, each of which is attached to an end of a horizontal balance lever, so that they shall be kept down (to permit the drawing head to operate) by the weight of the roving, and fly up to stop the machine the moment they are relieved of the weight of the rovings as described.

I also claim the employment of a flying trigger, substantially as described, in combination with the apparatus for shifting the belt, or any other substantially the same as described, whereby the trigger flies past the end of the catch lever, to permit the mechanism that shifts the belt to be re-set without delay as described.

CHARLES DANFORTH.

No. 6015.—*Machine for Filing Saws.*

Having thus fully described our apparatus for filing and setting the teeth of saws, what we claim as our invention and desire to secure by letters patent, is, first, the combination and arrangement of the operating file handle H, the adjustable standards G G, rising from the turn table I, the adjustable bearing plates J J, (secured to the standards G G,) the elastic arm *m*, point *d*, and curved gauge plate *k*, with each other and with the saw clamp A, substantially in the manner and for the purpose herein set forth.

PRESBERY NORTON.
FRANKLIN D. COTTLE.

No. 6016.—*Improvement in Corn Planters.*

Having thus fully described my improved grain and seed planter, what I claim therein as new, and desire to secure by letters patent is the combination of the index *a*, on the axle *g*, and the numbers or marks on the cover K of the grain box, with the apertures *i*, in the planting plate D, substantially in the manner and for the purpose herein set forth.

B. F. PARTRIDGE.

No. 6017.—*Improved Dies for bending Tube Skelps.*

Having thus fully described my improvements in forming skelps of wrought iron into tubes ready for welding, what I claim therein as new and desire to secure by letters patent, are the dies or tongues, formed substantially as herein described, for forming skelps into the proper curve for welding, in the manner set forth.

JOSEPH M'CULLEY.

No. 6018.—*Improvement in Bog Cutters.*

Having thus fully described my invention, what I claim therein as new and desire to secure by letters patent is, first, the providing the front or inclined part of the runners of the sled with steel knives *b*, for the purpose herein specified. Secondly, I claim the combination of the sled *a*, with the frame work *c*, to which the horizontal knives are attached. And, lastly, I claim

the combination of the double horizontal knives *h h*, &c., resting on the surface of the ground, and inclining backward at an angle of about 45 degrees with the pole *g*, for the purpose and in the manner herein specified and fully made known. JOHN D. FILKINS.

No. 6019.—*Improvement in Cast Iron Car Wheels.*

What we claim as our invention and desire to secure by letters patent, is the peculiar construction of the spoke of the wheel here described, the same being formed of a folded plate, doubling to nearly parallel lines at the hub, and expanding towards the rim, uniting to it in nearly a semi-circular form, thus covering and sustaining the rim, while the complex curvature of the spoke, the same being curved in a verticle as well as in a lateral direction, allows an expansion and contraction of the metal favorable to the durability of the wheel, and permits it to be cast solid with an entire hub without cracking; the whole being constructed and arranged substantially as above set forth and described. LEWIS DEAN.
A. HIGHAM.

No. 6020.—*Improvement in Ploughs.*

I do not claim the invention of any particular plough, but simply this method of regulating the draught by the above described standard D, bolt F F, and regulating set E. It can also be applied to all agricultural tools where a clevis is required of any kind.

HEMAN B. SINCLEAR.

No. 6021.—*Improvement in Cast Iron Car Wheels.*

Having thus fully described my improved wheel, what I claim therein as new, and for which I desire to obtain letters patent, is the combination of the arch piece *b*, and the hollow annulus *c*, and the solid annular parts *d* and *f*, by which the solid hub is connected with the rim and flanch, the whole being arranged substantially in the manner and for the purposes above set forth and specified. WM. B. TREADWELL.

No. 6022.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention and desire to secure by letters patent, is the constructing of wheels for railroads, or other purposes, with spokes, single plate and double plate combined, as herein described.

JAMES M. COOK.

No. 6023.—*Improvement in Body Braces.*

I disclaim the invention of parallel spinal springs, used in combination with shoulder braces, illium springs, and abdominal pads; but I claim as my invention and improvement the employment of combined serpentine and straight slotted springs, with the shoulder straps B B, and back pads C C, when constructed as described; said elastic serpentine springs being formed and arranged as set forth, admitting of a more easy, lateral and twisting motion of the body of the wearer than can be obtained by the use of the flat dorsal spring as now used—said serpentine springs having likewise a constant tendency to extend themselves longitudinally, which causes them to have a continuous upward bearing against the shoulder braces, which relieves the spine of a portion of the weight of the upper part of the body by a constantly lifting action.

I likewise claim the manner of constructing the back pads C C, as described, that is to say, each with a revolving ring to which the illium spring is attached, and circular notched groove in which the pinion and axle (attached to the ring and illium spring) play round freely during the operation of adjusting the abdominal pad—the teeth of the pinion being constantly engaged with the teeth of the circular groove, the use of said circular groove allowing the abdominal pad to be changed to a variety of positions, horizontally, vertically, obliquely.

I also claim the manner of constructing the abdominal pad G, that is to say, with a hollow revolving plate *o* for the purpose of taking in the spring *n*, and letting it out by turning plate *o*, and thus graduating its length and pressure upon the inner plate *m* of the abdominal pad G, thereby fitting the pad to different protuberances of the abdomen. HENRY MELLISH.

No. 6024.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention and desire to secure by letters patent, is the single plate which connects the hub and rim with curved arms thereon, reversed to the right on the one side of the plate, and to the left on the other, and likewise my mode of tempering the said wheels herein described, by which all injury to the chill of the wheel is avoided.

EDWARD BONNEAU BAKER.

No. 6025.—*Improvement in Knitting-Needles.*

What I claim as my invention and desire to secure by letters patent, is the application of a latch or tongue applied to the hook of the needle, and operated as herein described. JAMES HIBBERT.

No. 6026.—*Improvement in Cast Iron Car Wheels.*

What we claim and desire to secure by letters patent, is the *mode of connecting the arms* of one side with those of the other side, when formed substantially *in the manner before mentioned.* A. T. CONVERSE.
WM. S. COOLEY.

No. 6027.—*Improved Rotary Blacksmiths' Tuyere.*

I do not claim the invention of a revolving or vibrating hearth for blacksmiths' forges, as these have been made and used; but what I do claim as my invention, and desire to secure by letters patent, is the employment of a revolving perforated spheroid oblate at one of its poles, as a rotary central bottom for blacksmiths' forges, in combination with the convex hearth and attached air chamber, constructed, arranged and operated substantially in the manner and for the purpose herein set forth, performing the combined office of a fire regulator and coal agitator. EPHRAIM HARRIS.

No. 6028.—*Improved Lubricating Compound.*

Having thus described the manner in which my anti-attrition is compounded and used, what I claim therein as new, and desire to secure by letters patent, is the combination of ingredients herein described, or of others possessing similar properties, and forming an analogous compound, whether the proportions be the same as herein set forth, or varied to any extent that the same

may admit of, without changing the peculiar character of the compound as a lubricator.

PATRICK S. DEVLAN.

No. 6029.—*Improved method of directing the scoops in Dredging Machines.*

Having thus described my invention, I do not claim the revolving buckets for excavating, as they have been long used for that purpose, but I claim the vertical sliding frame F, to regulate the scooping line of draught, in combination with the suspension levers, whereby the buckets, as they revolve over the pulleys, are made to scoop at any angle at any depth.

JAMES CALLAGHAN.

No. 6030.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention and desire to secure by letters patent, is tieing and bracing the arms of the wheel together in the annular space between the rim and hub, substantially as described in the foregoing specification and represented in the annexed drawings, forming intermediate, or auxiliary, or zig-zag rims in said annular space, and double the number of bearing points on the rim that there are on the hub, by which form of construction cast iron chilled car wheels are rendered much stronger and less liable to fracture in casting than the cast iron spoke wheel in use.

SAMUEL TRUSCOTT.

No. 6031.—*Improvement in Boot Trees.*

What I claim as my invention and improvement, and desire to secure by letters patent, is the method of crimping boot fronts by means of a sliding lever, affixed to an ordinary boot form, on the back and bottom thereof, extending from the top of the form around the heel with a joint, and thence under the foot of the form towards the toe thereof.

I claim the combination of the jointed sliding lever B B, C C, inclined planes *l*, *m*, *n*, slides D D, *a*, *b*, *d*, and E, hinge X, tie *p*, stop *r*, and the screws as applied thereto for the purposes set forth, constructed and operated in the manner and form above represented and described.

HENRY WRIGHT.

No. 6032.—*Improvements in Stop Cocks for hot water and steam.*

Having thus described the construction and operation of my improved hot water cock, what I claim therein as of my invention and discovery, and for which I solicit letters patent, is the wooden stopper, in combination with an expanded recess for its reception, and with a stem entirely unconnected with it, there being a washer between them, so that the stopper may be pressed down upon its seat by the stem without turning, whereby the cost and difficulty of making and keeping it in repair is lessened, and its durability and efficiency increased, as herein set forth.

JOHN SHERIFF.

No. 6033.—*Improvement in Clapboard Machines.*

Having thus fully described my improved clapboard machine, what I claim therein as new, and desire to secure by letters patent, is the combination of the several parts thereof in such manner that it will automatically saw clapboards of the shape herein described, viz: the vibrating frame or adjustable portion of the carriage hinged to the lower portion, the head block D, the racks

I I, (projecting from D) the shaft H, with the pinions *i*, mashing into racks I I, the shaft F, geared to H, the ratchet wheel *b*, and the vibrating lever *d*, connected to shaft F, the palls *c c*, on the upper end of *d*, playing into the ratchet wheel *b*, the studs M N, projecting from the rear end of the machine, the leg or supporter *g*, (descending from the adjustable portion of the carriage,) the inclined planes *j*, *k*, *l*, rising from the front end of the vibrating lever L, the tooth *w*, projecting from the inner side of L, the ratchet wheel K, secured to the side of the machine, the palls *o*, *v*, (descending from the carriage,) the axle *p*, with the tooth *r*, and the balance lever V, the vibrating levers X, and Y, the axle *m'*, the toothed wheel Z, and pinion *b'*, on *m'*, the pinion *a'*, on the shaft J, the pinion *u*, on the shaft W, mashing into the rack *z*, on the underside of the carriage, the elastic notched rod *e'*, rising from the front end of lever Y, the retaining pin *h'* projecting from the side of the machine, the weight *g'*, suspended to the front end of lever Y, the elastic notched rod *f'*, rising from the rear end of lever X, the retaining pin *h''*, projecting from the side of the machine; the weight *g''*, suspended to the rear end of lever X, and the block *t'*, projecting from the underside of the carriage—the above enumerated parts, or their equivalents, I claim the arrangement and operation substantially as herein set forth. I also claim the particular combination of the inclined planes *j*, *k*, *l*, rising from the front end of the vibrating lever L, the tooth *w*, projecting from the inner side thereof, the ratchet wheel K, the leg or supporter *g*, (descending from the adjustable portion of the carriage,) the axle *p*, with its retaining tooth *r*, and balance lever V, the palls *o*, *v*, descending from the carriage, and the projection *q*, from its side, arranged and operating substantially as herein set forth, for the purpose of producing a regular alternating up and down movement of the outer edge of the adjustable or vibrating portion of the carriage.

I also claim, in combination with the respective parts for vibrating the upper portion of the carriage, the studs M, and N, the vibrating lever *d*, the palls *c*, *c*, the ratchet wheels *b*, the shafts F, and H, and the racks I I, (connected to the head block D,) for the purpose of imparting the proper feed motion to the timber placed upon the vibrating portion of the carriage, substantially in the manner herein set forth.

I also claim the combination of the toothed wheel Z, having internal teeth, and the pinion *b'*, on the same axle, with the pinion *a'*, on the vibrating end of the shaft J, and the weighted levers and spring catches for the purpose of communicating a slow forward movement to the carriage, and a rapid backward movement thereto, substantially in the manner herein represented and described.

By the foregoing claims I do not intend to limit myself to the exact form, number and arrangement of parts as herein described and represented, but shall vary them as I may deem expedient, whilst I attain the same end by means substantially the same.

BLISS CORSER.

No. 6034.—*Improvement in Harvesting Machines.*

First. I claim the *form* of the *fixed sickles t*, with the *curved edges*, in combination with the *triangular sickles q*, attached to the *vibrating bar p*, and operated substantially as herein above specified.

Second. I claim the *combination* and *arrangement* of the guide rail U, with the *reel heads b*, the *chain bands a*, the *revolving rake g*, and the *inclined platform* S, formed, applied, and used substantially as above set forth.

Third. I also claim the combination of the *trap doors* or *folding platform*

W, for the purpose of forming and dropping the grain in a bundle, with the *cam-blocks, inclined wedge,* levers and cord, or other similar devices, arranged and operated in substantially the same manner for attaining the same object. OLIVER BARR.

No. 6035.—*Improvement in Looms.*

What we claim as our invention and desire to secure by letters patent, is as follows:

First. We claim the combination of the picker valve alternator and slide spring, operated in the manner and for the purpose described.

Second. We claim the combination of the picker table, picker arm, picker staff, picker roller, and roller 15, arranged in the manner and used for the purpose set forth.

Third. We also claim the combination of the marcher, oblique slide, marcher slide, marcher catch, levers 38, catch springs, and heddle guides, constructed in the manner and for the purpose set forth.

JUSTUS BUTLER.
ALFRED BIGELOW.

No. 6036.—*Improvement in machinery for Post-marking Letters, &c.*

What I claim in my invention for post-marking letters, is the spring grips as applied in combination with the cylinders B, and C, and letter conveyor, and to each printing block and bed, substantially as described.

Second. I claim spring stops Y, and apparatus for working them, as applied in connection with each endless belt or apron and the spring grips, and made to operate substantially as specified.

And lastly, I claim to make the beds or printing surfaces or blocks, so as to be capable of receding and adapting themselves to letters or parcels of various thicknesses, as specified. EMERY N. MOORE

No. 6037.—*Improvement in Cultivators.*

I do not claim in this application the invention of a wheeled cultivator nor hollow wrought iron teeth, with keys driven into the hollows of the teeth; but what I do claim as my invention, and desire to secure by letters patent, is—first, the mode of raising and lowering the frame A, containing the cultivator teeth M, for the purpose of gauging the machine for deep or shallow ploughing, or for moving it from place to place, without causing the teeth to touch the surface of the earth, by means of the *before described combination and arrangement of the crank axletree D, cogged wheel F, cogged segment H, short axle G, lever I, and perforated holding plate L, employed in combination with the frame A, of cultivator teeth M, and sustaining wheels W W.*

I also claim the combination and arrangement of the binding and sustaining plates N, made as described, in combination with the transverse beams as described, to which said plates are secured.

DAVID B. ROGERS.

No. 6038.—*Improvement in machinery for making Boxes.*

Having thus described the nature of my invention, the way in which it is constructed, and its operation, I do not claim any particular part of the machine as new, but what I claim as my invention, and for which I desire letters patent, is the combination of well known principles to effect an object

which has not been effected before, which is to turn a box and cover by one operation, as fully set forth and described. What I claim as my invention, is the arrangement of the sweep S S, in combination with the gauge rods E E, for varying the length of box and cover in combination with the ratchet wheels R R, and the curved and notched rods L L, as fully described and set forth. I finally claim the whole as a combination of the machine for effecting the object as fully set forth and described.

WILBUR M. DAVIS.

No. 6039.—*Improvement in Mill Bushes.*

What I claim as new, and desire to secure by letters patent, is the constructing and arranging the bush for a verticle spindle or shaft, in such a manner that it will perfectly adjust itself to the bearing surface of the spindle or shaft, as it or the bush wears away by friction, by making the bearing surface of the spindle or shaft, and the aperture in the bush for its reception, of a corresponding conical form, and so fitting the bush into a supporting frame that it may have free verticle play therein, and be kept in a proper position for bearing upon the spindle or shaft with the requisite force by means of levers and weights, or their equivalents, substantially as herein set forth.

I also claim in combination with a conical self-adjusting bush for vertical shafts or spindles, the oil cup having inclined revolving lubricators, whereby the necessary quantity of lubricating material is supplied to the bearing in the manner herein set forth.

I also claim, in combination with a bush frame or cylindrical enclosing support, the use of bushes or bearings for vertical shafts or spindles, with slightly spherical exterior zones to traverse the interior of the vertical frame, whereby trifling deviations from a perpendicular position in the spindle may take place without danger of deranging the supporting frame or the closing plate of the bush that secures the oil from dust, in the manner herein set forth; not intending in these claims to limit myself to the precise arrangements described, but to vary them at pleasure, while I attain the same ends by means substantially the same. HAZARD KNOWLES.

No. 6040.—*Improvement in Indicating Telegraphs.*

What I claim as my invention and improvement, and desire to secure by letters patent, is—

1. The mode of conveying intelligence at distances by means of a revolving tooth dial plate, marked in the manner set forth with the several successive repetitions of the series of numerals 0, 1, 2, 3, 4, arranged in a circle on the face of the same for representing the letters of the alphabet; said dial plate being turned by degrees, as required by the combination of the escapement cord and weight, the pallets, lever and spring, the armature and lever being actuated by the electro magnet, by breaking and forming the circuit; the whole forming what I call "*The American Indicating Disc Telegraph.*"

2. I also claim the peculiar construction and invention of the escapement, as herein described, for actuating the dial plate, consisting of the combination of the pallet bar, the pallets, the triangular teeth; the whole work being confined to the inside, instead of being on the periphery of wheels, as pallets and teeth of escapements heretofore have been constructed.

3. I also claim as my invention and improvement the system of signs, consisting of the combination of the numerals 0, 1, 2, 3, 4, for indicating all the

letters of the alphabet and words and sentences, by the use of which the necessity of having the whole or any part of the alphabet on the revolving disc, and of turning it a revolution, or nearly so, in order to indicate a particular letter, is dispensed with, it being only necessary to turn the dial plate a segment or so of a circle at each combination of figures to indicate a letter, which is done instantly, by simply forming and breaking the circuit; and having thus formed the letters, it is evident that words can be spelled with great rapidity, substantially as herein set forth.

L. G. CURTISS.

No. 6041.—*Improvement in Cast Iron Plate Car Wheels.*

What we claim as our invention and desire to secure by letters patent, is the arrangement of cross ties and stays in the interior part of the hub of a plate car wheel, in combination with the expansion disks or rings herein described, whereby those ties which unite two contiguous plates or disks shall alternate with those ties which connect one of said two disks to a third, by which means the elasticity both of the disks and stays is made available to meet the shrinkage of the wheel; not intending in these claims to confine ourselves to the precise arrangement described, but to vary the same at pleasure, while attaining the same ends by means substantially the same.

HORACE FELTON.
PERLEY D. CUMMINGS.
HARINGTON HINCKLY.

No. 6042.—*Improvement in rails and wheels for turning curves of Railroads.*

What I claim as new and desire to secure by letters patent, is the giving to the inner rails on railroad curves a greater breadth than is necessary for the bearing of the wheels thereon, and so sloping the side inwards towards the middle of the track as to prevent any contact between the slope and the tread of the wheel, while it still serves to guide the flanch of the same, and thus to allow the coning part only of the wheel to travel on the inner rail of the curve, substantially in the manner herein set forth.

I also claim, in combination with the widened and bevelled inner rails of railroad curves, the use of wheels having treads divided into two portions, the one cylindrical or nearly so, and the other coning, in the manner and for the purposes herein set forth. Not intending in these claims to limit myself to the precise arrangements herein described, but to vary the same at pleasure, while I attain the same ends by means substantially the same.

J. F. B. FLAGG.

No. 6043. — *Improvement in Cylinders for carrying and supporting Cards, &c.*

What I claim as new and of my own invention, and desire to secure by letters patent of the United States, is that constructive arrangement and conjoint application and action of the parts employed as described and shown herein, by which metal plates, surrounded by a wire helix and solder, are united to form cylinders of more than usual strength, in proportion to weight, and the application of such cylinders to any mechanical purposes, for which they are or may be available.

STEPHEN R. PARKHURST.

No. 6044.—*Improvement in the manufacture of Cylinders for Burring Wool, &c.*

Having thus described my improved mode of constructing a cylinder for burring, opening, &c., cotton, wool, and other fibrous materials, I shall state my claim as follows:

What I claim as new, and desire to have secured to me by letters patent, is a *cylinder* for burring, opening, picking, carding and performing all other similar operations on cotton, wool, &c., formed or produced by winding toothed wire (having flanges and teeth as herein above specified) upon the periphery of a metallic cylinder, either in a spiral or straight direction, whether the said wire be fastened thereon in spiral grooves and properly staked, or by soldering or otherwise, as herein above suggested.

FRANCIS A. CALVERT.

No. 6045.—*Improvement in Shingle and Stave Dressing Machines.*

What I claim as my invention and desire to secure by letters patent is—

First. The construction and application of the quadrangular wheel, with its appurtenances, viz: the rollers and hands, to the use and purposes above described.

Secondly. I also claim the invention of the sliding or vibrating table, and its application, with its appurtenances, to the uses ascribed to them above.

Thirdly. I too claim the application of the inclined plane to the purpose described above; and—

Finally. I claim the above described construction and arrangement of the whole machine, taken in combination, and applied to the purposes ascribed to them above.

ELISHA LUTER.

No. 6046.—*Improvement in Chucks for Lathes.*

Having thus described the construction of my universal self centering chuck, what I claim therein as new and desire to secure by letters patent, is the combination of the connecting rods and jaws jointed together, and moving simultaneously, by means of a screw or otherwise, with the chuck plate, whether the several parts be made and arranged as herein set forth, or in any other substantially similar manner, by which the jaws are moved towards or from the centre of the plate at the same time and at equal speed.

WILLIAM GRANT.

No. 6047.—*Improvement in Shower Baths.*

Having thus fully described my invention, I may add, that I do not claim as my invention, the combination of lateral jets with a rising and falling cistern, but what I do claim, is the combination of the showering pan C, a divided cistern and horizontal arms, as herein described, whereby the head may be showered with water of one temperature and the lower parts of the body with water of another temperature during the same operation.

I also claim in combination the douche bath, the divided cistern and tubes with horizontal jet arms, as herein set forth, to give a douche to the head and a shower to the other parts of the body of a different temperature.

I also claim making the showering pan C, capable of being separated from the cistern, and of thereby making way when required, for the use of the central douche tube D, as herein set forth.

I also claim the adjustable sliding section tubes E E′, &c., having horizontal

moveable arms *aa'*, &c., with jets, as herein described, capable of being brought nearer to or more remote from each other, for the purpose of concentrating more or less the shower thrown on the lower parts of the body; not intending in these claims to limit myself to the exact arrangements of parts herein described, but to vary the same at pleasure, while I attain the same ends by means substantially the same.

JAMES CORTLAN.

No. 6048.—*Improved Roller Ox shoe machine with moveable dies.*

I make no claim to the frame, roller, axles, and gearing, as these are made and arranged like the ordinary rolling mills, nor do I claim segment dies fastened on rollers by screws; but what I do claim as my invention and desire to secure by letters patent, is the employment of the segment and triangular dies H I, constructed and arranged and operated substantially as above described, in combination with the cylinder made with bevelled collars and nut for securing them, as herein set forth.

PHILIP PITTS READ.

No. 6049.—*Improvement in Seed Planters.*

Having thus fully described my improved corn drill or seed planter, what I claim therein as new and desire to secure by letters, is the combination and arrangement of the grain box B, the cup H, the rotating perforated plate A, the elastic brush J, and the recesses V.V, in the lower edge of the rear side of the grain box placed in such a manner that the operation of the said parts is brought immediately under the eye of the operator for causing a single kernel to be deposited at a time in the drill as the machine is moved forwards, substantially in the manner herein set forth.

E. J. DICKEY.

No. 6050.—*Improvement in Seed Planters.*

Having thus fully described my improved seed drill, what I claim therein as new and for which I desire to secure letters patent, is—First. The construction and arrangement of the adjustable hopper and grooved roller combined, as above set forth, and for the purposes designated. Secondly, I claim the centre hind wheel *m*, for guiding and regulating the apparatus as herein before described.

JACOB C. MILLER.

No. 6051.—*Improvement in Wool Cleaning and Lapping Machine.*

Having thus described my improvements in machinery for picking, cleaning and forming a lap of cotton, &c., I shall state my claims as follows:

What I claim as my invention and desire to have secured to me by letters patent, is a toothed cylinder for forming a lap of cotton, wool, or other fibrous material, to be used in lieu of the wire netted cylinder, as herein above set forth.

I also claim the combination of the burring apparatus, or an apparatus for opening, picking, and cleaning cotton and wool, constructed substantially as herein above described, with the calender and lap rollers; the arrangement and combination being as herein above set forth and for the purposes specified.

FRANCIS A. CALVERT.

No. 6052.—*Combined Double Hinge and Spring.*

What I claim as my invention and desire to secure by letters patent, is *double jointed hinges*, constructed substantially as herein described, in combination with a chain or cord and two springs, arranged as herein set forth.

ANDREW B. TAFT.

No. 6053.—*Improved self-inflating and folding Life Boat.*

What we claim and desire to secure by letters patent, is forming the sides of life boats of two or more thicknesses, of flexible material, impervious to both air and water, so arranged and in combination with gunwales, or intermediate gunwales, and the bottom, as to form air chambers on both sides of the boat from stem to stern, which may be inflated with air, more or less, by raising up the gunwales or intermediate gunwales from the bottom of the boat on which they rest, when the boat is folded up substantially as described.

WM. SCHNEBLY.
THOMAS SCHNEBLY.

No. 6054.—*Improved process for Welding cast to wrought Iron or Steel.*

We do not claim heating wrought iron in a furnace and then placing it in a mould and casting iron around it so as to enclose it therein, that having before been done; but having thus fully described our improvement, what we claim therein as new, and for which we desire to secure letters patent, is heating the steel or wrought iron to which the cast iron is to be affixed before casting the melted iron upon it, by means of a portion of melted iron poured against that side of the steel which is not to be attached to the finished article, substantially in the manner and for the purpose set forth.

We also claim repouring the metal upon the steel, as described, by which much saving in the cost of melting more iron than is required for the casting is saved.

M. FISHER.
WM. MARTIN, Jr.

No. 6055.—*Improvement in Machines for making Envelopes.*

Having now described the various parts of our machine and the operation of the same, what we claim as our invention and desire to secure by letters patent, is the invention herein described for making envelopes, the same consisting of the stamper rod, the gumming apparatus, and the folding apparatus, each and all constructed and operating substantially in the manner set forth.

JESSE K. PARK.
CORNELIUS S. WATSON.

No. 6056.—*Improvement in taking Daguerreotype Pictures.*

I do not confine my invention to the use of a screen, made of any particular material or materials, but what I do claim as my improvement in combination with the daguerreotype process, is the above specified mode of arranging and operating an opaque, or partially opaque screen having an apperture or its equivalent, the same being placed between the sitter or object and the camera, and put in motion or maintained in position substantially as above specified.

JOHN A. WHIPPLE.

No. 6057.—*Improvement in Guards or Strippers for Burring Machines.*

Having thus described my improvements, I shall state my claim as follows: What I claim as my invention and desire to have secured to me by letters patent, is a guard or stripper cylinder, (used in machines for burring wool and cleaning cotton,) *constructed with steel strips* a a, *&c., for scrapers, arranged and combined with the wooden segments* d d, *&c., about a roller or shaft, substantially as herein above described.* ALEX. WRIGHT.

No. 6058.—*Improvement in Carving Machines.*

What I claim as my invention, is the peculiar system of jointed parallel bars, moving frame, or two rack bars in combination with each other and either of the two moving carriages, and made to operate in manner so as to impart to one of said carriages a greater degree of velocity of motion than the other under the circumstances, and for the purpose of moving the tablets or chucks, and making a copy of enlarged dimensions, all as above described.

And I also claim the combination of the two sets of carriages A and B, R and S, and their two sets or systems of parallel bars and moving frame and rack bars, as applied together and combined with the tablets, substantially in manner and for the purpose of imparting to the tablets lateral and transverse movements at different velocities, as specified, and for the purpose as herein before explained.

And I also claim the frame Z, of each tablet, and the mechanism for giving to it a transverse dip or inclination, in combination with its carriage R S, and the rocker shaft and mechanism for inclining and turning the tablet in lateral and other directions, as specified. HEZEKIAH AUGUR.

No. 6059.—*Improved combined Hinge Fastener and Shutter Opener.*

Having thus fully described the construction and operation of my improved hinge for opening and closing and securing window blinds from the inside of apartments, without raising the sash, I will here state that I do not pretend to be the first inventor of a hinge to accomplish the above named objects by rack and pinion or by screw, but what I do claim as my invention and desire to secure by letters patent, is—

1st. The peculiar manner in which I construct the hinge and propelling rod combined therewith, by which I unfasten, turn back, and secure window blinds, by simply moving the rod outwards, and again unhook, turn and refasten the said window blinds by reversing the movement of the rod without raising the sash in either operation, that is to say, I claim constructing the rod P, with spaces P^5 P^6, in the side and inclined planes P^3 P^4, in the top thereof at the end of the rack, in combination with the inclined planes I J, on the upper half of the hinge, arranged and operating in the manner and for the purpose above described.

2d. I also claim the before described mode of locking the upper and lower parts of the hinge by means of the hook P^a, on the end of the rod P, entering a corresponding groove in the upper part of the hinge—the rod being prevented from rising by being passed through the mortise in the box A, of the lower half of the hinge, by which mode of fastening, the blind is effectually secured against being raised or opened from outside the building, as described. A. S. PELTON.

No. 6060.—*Improvement in Registers for Hot-air Furnaces.*

I do not claim the wheel itself, as new, or a thing by any means patentable, but what I do claim and desire to secure by letters patent, is the application of the upright or vertical wheel to the opening and closing of registers and ventilators, the edge or top of which is placed flush, or nearly so, with the top surface of the register, and can be acted upon with the foot, if desired. This wheel is so placed, and connected to the valves by means of a moveable connecting rod, which rod is suspended upon a pin projecting from the side of the wheel, and connected or attached to the valves by pins projecting from the ends of the valves, at a distance from their centre, substantially as described. CHAS. F. TUTTLE.

No. 6061.—*Improvement in Cooking Stoves.*

What I claim as my invention and desire to secure by letters patent, is the arrangement substantially as herein described of the damper *i'*, the flues *i*, and the doors *d d*, for the purpose of cooling the oven and heating the apartment, in which the stove is placed, by promoting the radiation of heat, and the circulation of hot air.

I also claim the arrangement of the damper *k*, by which the hot air in the flue *m*, may be directed into, or around the oven.

EVAN LEWIS EVANS.

No. 6062. — *Improvement in the reduction of Ores.*

Having thus described the nature of my invention, and the best means I am acquainted with for performing the same, I would remark, that I do not confine myself to the precise details herein described, so long as the peculiar character of either part of my invention be retained; but what I claim as my invention, is the above described flux composition to be used in the manufacture of metals, as specified, the same consisting in muriatic acid, or any chemical equivalent therefor, water, charcoal, coal or anthracite, or any carbonaceous equivalent therefor, and caustic lime, magnesian lime stone, baryta, or any alkaline or earthy chemical equivalent, the same being combined and used in the proportions above represented, or in any others which will produce like results. ALEXANDER PARKES.

No. 6063. — *Improvement in Baking Apparatus.*

Having thus described my improvements, I shall state my claims as follows: What I claim as my invention and desire to have secured to me by letters patent, is a cooking or baking apparatus having several parallel baking chambers, with divided horizontal flue spaces between them, communicating with vertical flue spaces on each side of them, substantially as herein above described, and so as to make the smoke, &c., pass around said chambers, as above set forth. I also claim connecting said chambers with each other, by the combination of the turning registers *c' c' c'*, in their backs with the vertical hollow shaft *d' d'*, in the manner and for the purpose herein above set forth. JOHN P. HAYES.

No. 6064.—*Improvement in Railroad Trucks.*

What I claim as my invention and improvement, and desire to secure by letters patent, is giving to the axis of the wheel such an angle as will join their circumferences in the manner described; secondly, I claim giving to

the flanges any angle which shall be less than a right angle to the bearing faces of the wheel, so that when the wheels are upon the rails in their proper position in the trucks, the said flanges shall project under the concave sides of the rails, in the manner and for the purpose described. Thirdly, I claim the shapes and combinations of the truck frame pieces, so as to form the upper and lower bearings for the wheels, in the manner described and set forth herein. JACOB G. DAY.

No. 6065.—*Improvement in Dumping Cars.*

I do not claim the mode of supporting a car body by means of semicircular arcs or rockers affixed thereto, and made to rest and rock on the top of the truck frame, as the same has heretofore been effected, but that which I do claim, is my improvement or mechanism for sustaining and operating the car body, the same consisting in the rollers or small wheels E F, and their rail or bearing plates as constructed, combined together and with the body and truck frame, and made to operate the car body substantially as above specified. My said invention enabling me not only to construct a dumping car much lower than others in general use, but so low as to be used in trains with common merchandise cars. ALPHEUS NETTLETON.

No. 6066.—*Improvement in the manufacture of India Rubber.*

We here disclaim the use of rubber and sulphur alone, as also the submitting of rubber, or rubber compounds to a high degree of heat, patents having been granted for that process in this and other countries; neither do we wish to secure the right of coloring rubber, such having frequently been done by rubber manufacturers.

But what we do claim and wish to secure by letters patent, is the combination of caoutchouc in its several varieties, with either carbonate of zinc, sulphate of zinc, or the other salts of zinc with sulphur, in manner, form and proportion as herein before set forth. H. G. TYER.
JOHN HELM.

No. 6067.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by Letters Patent, is the combination of the perforated registers with the principal and auxiliary ovens, for the purpose of either establishing a communication between them, or separating them as herein set forth.

I likewise claim the combination of the perforated sliding plate *i*, with the plate *g'*, to open and close a communication between the ovens *d*, *k*, and the flue *e*, the plate *g'*, also by being removed furnishing a ready means of access to the flue for the purpose of cleaning it. JOSEPH FEINOUR.

No. 6068.—*Improvement in Cooking Stoves.*

Having thus fully described my improvement and its mode of application, what I claim therein as new, and for which I desire to secure letters patent, is the employment of air passages for the purpose of equalizing and economizing the heat in the oven, substantially in the manner described.

I also claim the construction for the introduction of heated air into the oven, as described, and withdrawing the same, and passing it under the grate of the fire chamber to support combustion, substantially as set forth.

I also claim the divisions (*g g*) and (*k*) between the fire chamber and oven, to form the air passages illustrated in the body of the description, substantially as set forth. R. D. GRANGER.

No. 6069.—*Improvement in Cooking Stoves.*

Having thus fully described my improvements, what I claim therein as new, and for which I desire to secure letters patent, is the combination of the tubular grate, or air heating tubes with damper (*b*) below the same, in the manner described substantially.

I also claim the combination of the air-heating grate tubes at the bottom and back of the fire chamber, together with the oblong chamber (*f*) under the smoke flue, for the purpose of conveying air into each end of the oven, by which a greater amount of radiating surface for heating air is obtained with the oven, as set forth, for the purpose of baking by means of heated air, substantially in the manner above described.

R. D. GRANGER.

No. 6070.—*Improvement in Cooking Stoves.*

What I claim as my invention and desire to secure by letters patent, is—

First. The combination and arrangement of the two end flues I and J, with the broad flue D, beneath the oven, and the flues E F, at the back and top thereof.

Second. I claim the combination and arrangement of the flues K^2, beneath the grate with the broad flue D, below the oven, by which the draft may be made to pass down through the grate and under the same in order to kindle from *the top*, by closing the upper register plates M, and the side flues I and J, and opening the central flues K^2, as aforesaid.

JOHN L. GEROW.

No. 6071.—*Improved Lubricating Compound.*

I therefore claim as my invention, the combination of the straits oil with the magnesia and the sperm oil, lard oil, or a mixture of the two, or any oleaginous matter, or matters possessing like powers of non-suspension, the same enabling me to make a very cheap and efficient anti-friction oil to be applied to the lubrication of machinery. A. S. GRENVILLE.

No. 6072.—*Improvement in the manufacture of Vinegar.*

What I claim as my invention and desire to secure by letters patent, is the making of good wholesome vinegar from the slops or swill, commonly so called, being the waste or spent liquors of distilleries, and other manufactories, in the manner and by means of the several processes, substantially as herein set forth.

I also claim the making of vinegar from the combinations of slops or swills, waste or spent liquors of distilleries, breweries, starch manufactories, and other workshops in which vegetable substances have undergone fermentation and partial decomposition, with vinous or alcoholic, or any laceous, saccharine or other vegetable materials added thereto, when employed to increase the strength of vinegar manufactured from said slops or swills, waste or spent liquors, in the manner herein set forth.

I also claim the above described combination of apparatus for effecting the several successive processes of converting the slops or swills of distilleries

and other manufactories, and the mixtures of the same with other materials added thereto, to increase the strength of the vinegar, not confining myself to the precise arrangement herein described, or to any specified number of vessels in which to perform each process, but varying the same as circumstances shall require, while I attain the objects herein set forth by means substantially the same. JAMES RUGGLES.

No. 6073.—*Compound spring Rock Drilling Machine.*

What I claim as my invention, is the improvement or combination of springs for supporting and operating the drill, the said combination consisting of the two long springs D E, and the two elliptic springs of each long spring, one of the same being *placed above its end and the other below the said long spring*, as described, the said long springs being connected together and made to operate, and simultaneously raise or lower the drill, essentially as above specified. I lay no claim to supporting a drill on or by a spring, or on or by a long bar, or lever elevated by a cam, or other proper contrivance, as I am aware, or think, that in all this there is no novelty, but I rest my claim on the above specified combination of springs for working the drill, as by my combination I not only preserve the drill in a vertical line during its movements, but I avoid the disastrous effects which have been usually produced on the machinery by the percussion or the blow of the drill.

SAMUEL JACK, 2d.

No. 6074.—*Improved Machine for making Suspender Buckles.*

What I claim as my invention and desire to secure by letters patent, is the combination of the cross head with the die L, for forming the buckle, when such cross head is jointed and acted upon by guides, as above described, by means of which I am enabled to bend the wire to an angle a little less than a right angle, for the purpose herein described.

CHARLES A. LENT.

No. 6075.—*Improvement in Flood Fences.*

What I claim as my invention and desire to secure by letters patent, is the manner of fastening the rails to the posts, that in opening they have the full scope of a semi-circle for the current of water to carry them, and on that account will answer for the safety of fences alongside of a water-course, as well as those crossing the water-course in any direction whatever; and also the shape of the mortise in the post, which I cannot describe better in writing than has been done. By examining the model it will appear more plain.

JOHN SOURBEER.

No. 6076.—*Improved Multiple Grate Furnace for Locomotive Boilers.*

What I claim as my invention is the combination and arrangement of two or more fire boxes and the water chamber or chambers between them with each other, and the main boiler and flues when said fire boxes are arranged vertically over each other, the whole being arranged, constructed, connected, and made to operate substantially as above specified, and for the purpose of using anthracite coal and increasing the fire and water surface in boilers whose position is such that it is difficult to extend the fire surface horizontally, and thereby improving the capacity of the boiler to generate steam as set forth. FREDERICK HARBACH.

No. 6077.—*Improved Hinged Claw Wrench.*

What I claim as my invention and desire to secure by letters patent, is constructing a wrench with a proturbance or cog on its side, and a hinged claw at its end of the form before described and represented in the annexed drawings, in such a manner as to enable a person to grasp and turn screw bolts and nuts of different sizes with the same, as herein set forth, or in any other mode substantially the same. ADAM HAY.

No. 6078.—*Improved Roller Weather Strip.*

What I claim as my invention and desire to secure by letters patent, is the combination of a roller in a groove, with the bottom of a door or window and threshold with a rebate in it, the said roller having play in its bearings, and the whole constructed and acting as described.

HIRAM C. BROWN.

No. 6079.—*Mill for Rolling Irregular Shapes by means of a Cam Pattern.*

Having thus fully described my improved apparatus for rolling metal to an irregular thickness by pattern, I wish it to be understood that I do not claim moving the top roller up and down by a pattern, that having already been done; but what I do claim as my invention and desire to secure by letters patent, is the employment of cams, as herein described, for elevating and depressing the top roller of a rolling mill, in combination with gearing, the same as above set forth, so that a pattern of any length on the cam may be made to effect the surface of any given length of bar, in proportional ratio, by change of the relative size of the gearing, by which I avoid in rolling long bars any long patterns difficult to handle and expensive to construct.

JOHN S. HALL.

No. 6080.—*Improvement in Cooking Stoves.*

I do not claim the forming chambers or spaces in the side plates of the oven for the admission of heated air, nor do I claim forming horizontal flues, in connection with flues in the doors, as I believe these have been constructed; but what I do claim as my invention and desire to secure by letters patent is—First. The arrangement of the vertical descending and ascending flues I J, constructed in the side plates of the oven, between the oven doors and the corners of the stove, in combination with the flues *g g*, leading from the middle flue G, to the smoke pipe S; and in combination with these I claim the arrangement of the sliding register M, as described and set forth.

W. STEPHENSON.

No. 6081.—*Improvement in Cooking Stoves.*

I do not claim to be the original inventor of a cook stove containing a combination of a large oven placed beneath a fire chamber, having descending and ascending flues, as this is a very old invention, but what I do claim as my invention and desire to secure by letters patent is—First. Making the cook stove with a cylindrical chamber of combustion C, for coal, having a vibratory grate K, at the bottom thereof, arranged above the oven, at the back of the ordinary chamber of combustion, in combination with a rectangular fire chamber B, for the burning of wood, and four descending flues D, two of which merge into a large flue D', in front, made the full breadth of the stove,

and decreasing in width until it intersects a horizontal flue E, beneath the larger oven made the length and breadth of the stove, leading into the usual central flue G, at the back, said coal and wood fire being used together or separately, as preferred; the front descending flue D′ being made to lessen in width as it descends towards the bottom flue, for the purpose of spreading the draft more equally beneath the oven as described.

Second. I also claim extending the oven upward behind the cylindrical coal chamber and the space occupied by the fire chambers, for the purpose of obtaining the radial heat of the convex surface of the cylinder in the upper portion of the oven, as described and represented at L, fig. 4, which shows said extension. JAMES WHITE.

No. 6082.—*Improvement in Tops for Wire Ropes.*

What I claim as new and as my original invention, is the construction of a conical "top," with two or more circles of notches, which vary in depth and extent, so as to suit the passage of the different circles of wires, which are to compose a compound strand, thereby uniting the advantages of a perforated plate with the easy curves of a common top. I also claim the application of one or more rings or bands similar to *f g*, for the purpose of keeping the different circles of wires apart, as well as to keep the wires separate among themselves. The whole arranged and to work in substance as above described. JOHN A. ROEBLING.

No. 6083.—*Improvement in Cooking Stoves.*

What I claim as my invention and desire to secure by letters patent, is the horizontal ventilating passage between the top plate of the stove and the top plate of the oven, separate from the flue which carries the burnt gases, arranged in the manner and acting to effect the several purposes of ventilation, substantially as herein set forth.

Second. I also claim the air passage leading from the top of the air chamber back of the fire plate, in combination with a ventilator passage independent of a smoke flue constructed and acting to carry away the over heated air from said air chamber, in the manner herein set forth.

Third. I also claim in combination with a horizontal ventilating flue, separate from the smoke flues, and crossing the top of the oven, the ventilating passages in the top plate of the oven having a regulating slide which adjusts the opening into the ventilating flue as herein described.

Fourth. I also claim in combination with a horizontal ventilating passage separate from the smoke flues, and between the top plate of the stove and the top plate of the oven, the front opening I, whereby the front tier of boilers is ventilated without interfering with the position, or with the convenient use of the other boilers, and without mixing their steam with the gases from the fire, and cooling them while passing round the oven in the manner herein set forth, but I do not claim the general principle of conducting away steam by pipes, leading into smoke flues or chimneys. G. B. WHITESIDE.

No. 6084.—*Improvement in machinery for Spinning Hemp.*

What we claim, therefore, as our invention, is the combination of levers *x* and *z*, or any mechanical equivalent or equivalents, a screw *d′*, and weight *s′*, or any mechanical equivalent or equivalents therefor, and the pulley S, and

friction plate V, the whole being applied and operated together, and so as to actuate the bobbin substantially in the manner and for the purpose as specified.
WILLIAM PEDRICK.
THOMAS M. MELVIN.

No. 6085.—*Improvement in Hoisting Apparatus.*

What I claim as my invention, is the friction disk B, the driving wheel D, and the system of levers or leverage applied thereto, as combined together, and with the hollow windlass barrel, and made to operate substantially as specified, and I also claim the combination of the same, and the spring weighing apparatus, which serves not only to present to the action of the friction apparatus, under certain circumstances, the relief of a spring, but also to determine the approximate weight of a body raised by the machinery.
ELIJAH LEARNED.

No. 6086.—*Improvement in Cooking Stoves.*

Having thus described the construction and arrangement of my improved premium stove, what I claim therein as new, and desire to secure by letters patent, is the combination of the diving pipe *i*, with the flues F, arranged as herein described, for the purpose of evenly distributing and equalizing the heat on the four sides of the oven, without using or requiring dampers, as herein set forth. ELISHA VANCE.

No. 6087.—*Improvement in plates for Boiler holes and tops of Stoves.*

What I claim as my invention and desire to secure by letters patent, is the application of a hollow shell of cast iron as a protective plate in connection with the holes A A, to centre or cross pieces for cooking stoves and ranges as described above. JOHN B. CHOLLAR.

No. 6088.—*Improved method of boring gun-barrels.*

What I claim as my invention, is the above described mode or process of boring gun barrels, or articles of like character, the same consisting in using the three drills X Y Z, in the order and manner specified.
HENRY PEELER.

No. 6089.—*Improvement in Cooking Stoves.*

I do not claim the construction of air flues or passages, whether below or back of the fire chamber, nor hot air flues surrounded by fire or heated gases as original with me; but I claim the special combination and arrangement of hot air and fire, and heated gas channels and flues in connection with the heating and culinary apparatus of a cooking range or stove as herein described, not limiting myself narrowly to the proposition nor precise form of parts set out in this specification. WILLIAM COBB.

No. 6090.—*Bolt and disk; Sectional Cannon.*

What I claim as my invention and desire to secure by letters patent, is the combination of metallic plates and bolts in the manner above described, to construct a cannon. JESS. FITZGERALD.

No. 6091.—*Improvement in Rotary Cutter Ploughs.*

What I claim as my invention and desire to secure by letters patent, are the rotary cutters K K, and screw shaft I J, in combination with the wheel and handle shafts arranged in the manner and for the purpose herein described. THOMAS J. TUTHILL.

No. 6092.—*Adjustable Lever Cut-off, with secondary Toe, No. 2.*

What I claim in this invention and combination is,

First. The use of a secondary toe G, having a fixed centre, which toe is moved by a motion taken from the usual rock shaft, and is lowered by a motion coincident with that of the piston, and by means of which the valve can be raised and returned to its seat at any portion of the stroke without concussion.

Second. The use of a double fulcrum lever K, the ends of which are alternately sources of motion and fulcra, and by means of which in combination with motions which are nearly at right angles to each other, the valve will be raised at the commencement of the stroke and then restored to its seat at such part of the stroke as the adjustment provides for.

Third. The use of the adjustable piece Q, by means of which the proportion of cut-off is changed.

Fourth. The mode of working the steam valve by the combination of the secondary toe G, lever K, adjustable piece Q, and arm N, substantially as set forth in this specification. HORATIO ALLEN.

No. 6093.—*Adjustable Lever Cut-off, with secondary Toe, No. 1.*

What I claim is the combination of the lever K, adjustable piece Q, and toe G, with the lifting rod B, by means of which the valve is raised at the commencement of the stroke, and the combination of the lever K, link M, and arm N, with the cut-off rock shaft O, by means of which the valve is lowered to its seat, substantially in the manner herein described.

HORATIO ALLEN.

No. 6094.—*Improvement in Music Stands.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of an apparatus with the music or book stand, which apparatus consists of the connecting bar (*b*), crank (*g*) and the second crank to slide the catch bar (*f*), constructed and operating as herein described and set forth. HENRY W. HOLLY.

No. 6095.—*Improvement in cutting Boot Heels.*

What I claim as my invention, is a combination composed of the following elements, viz: the inclined plane or bed, the curved cutters and machinery for deprressing them and expanding or separating them during their descent, the whole being constructed and made to operate substantially as specified, not meaning to confine each or any member of the said combination, to the exact form, shape, or construction, as described and exhibited, while it may be possible to vary the same without any substantial change of the whole combination, but to employ any machinery which may be considered a mechanical equivalent for such member.

And in combination with the bed and cutters, I claim the bent lever O, or any mechanical equivalent, the same being for the purpose as herein before explained. PHILANDER SHAW.

No. 6096.—*Piston Valve inclosed in the Steam Cylinder.*

What I claim as my invention and desire to secure by letters patent, is the employment of the two sliding ring valves G G, in combination with the cylinder A, and reciprocating piston K, for admitting the steam *to* and discharging it *from* the cylinder in reciprocal succession, by the alternate direct action of the piston on the ring valves, and without the intervention of any other agents, whether the valves be connected in the manner described or in any other way, which is substantially the same, and by which analogous results are produced. ISAAC L. BENNETT.

No. 6097.—*Improved Lever Scale for Canals, Railroads, &c.*

We claim nothing new in principle from the original knife edge lever, or platform scale, first made by Thomas Ellicott, (now deceased,) and since by ourselves and others; but what we claim as our invention and desire to secure by letters patent, is the combination with each other of two or more simple horizontal levers placed on each side of the top, or base of lock, canal, dock, railroad, or other desired place, and running parallel thereto, by which means the scale may be extended to any length, from the smallest to the greatest, with entire accuracy, and by the multiplication of said levers can be obtained a scale strong enough for any purpose, the whole operating substantially as above described. We also claim the connection between the said parallel levers and the graduated beam, as above described, by means of a rod or rods and bell cranks.

ELY ELLICOTT.
SAM'L A. ABBOTT.

No. 6098.—*Improvement in Dumping Wagons.*

What I claim as my invention and desire to secure by letters patent, is the arrangement of the cavities *c* and *n*, in combination with the friction rollers *m* and *x*, substantially as herein described, whereby the box is moved backward and forward (preparatory to and after tilting its load) easily and with but little friction, and when in place rests upon and in contact with the sides of the frame throughout its entire length, which greatly increases the strength and durability of the wagon. WM. H. START.

No. 6099.—*Improvement in Sewing Machines.*

In the above machine we claim as our invention the combination of a needle *a* and a hook *t'*, as constructed and made to operate together substantially in the manner and for the purpose of sewing cloth, or any other material or materials capable of being sewed, as specified.

CHARLES MOREY.
JOSEPH B. JOHNSON.

No. 6100.—*Improvement in Ploughs.*

Having thus fully described the manner in which I construct, arrange and combine the respective parts of my plough, what I claim therein as new and desire to secure by letters patent, is—first, the employment of what I have

denominated the auxiliary furrow side, forming a broad bearing at the heel of the mould board, which is to be formed and combined with the plough, substantially as described, either in one piece with the mould board or by an additional casting. I also claim the fastening of the cutter C, extending down on the land side to the bottom of the plough, in the manner and for the purpose set forth, by means of a mortise through it that receives the tenon b', on the wrought iron plate D, and which plate is bolted to the mould board at c': I claim the particular manner in which I secure the point and share to the cutter by means of the plate D, having a tenon b', thereon, and the ordinary screw bolt as described.

JOSEPH C. CLOUD.

No. 6101.—*Improvement in Cheese Presses.*

What I claim as my invention and desire to secure by letters patent, is the combination of the spring with the screw and toggle joint, as herein set forth, or in any other substantial similar manner, by which the same effects are produced.

LANSING KELLOGG.

No. 6102.—*Improvement in Coloring Bricks.*

I do not claim the mixing of clay with the coloring materials, for the purpose of coloring bricks, as that has been done before, but what I do claim as my invention and desire to secure by letters patent, is the peculiar process and manipulations of mixing coloring materials with the moulding sand for the surface of bricks, and the pressing the same upon and into the surface, so as to produce bricks of a uniform color upon the surface, as well as of a uniform shape and smoothness, the same being effected with greater economy than by mixing a sufficient quantity of coloring matter to color the whole body of the brick, and this regardless of any particular coloring matter or especial color to be produced when the bricks are burned, all of which is herein described and set forth.

CYRUS B. DOTY.

No. 6103.—*Improvement in Camphine Lamps.*

Therefore, that which I claim as of my invention, is the manner in which I construct the fountain, in order to allow the rays of light proceeding from the wick of the burner to pass downwards through both the internal and external concentric sides or shells of the fountain; that is to say, I claim an internal translucent side or shell in combination with an external concentric translucent side or shell, whether the said two concentric translucent sides of the said fountain be connected together by a translucent or opaque bottom.

EDWIN B. HORN.

No. 6104.—*Apparatus for ascertaining by inspection the saltness of water in Steam Boilers.*

Having thus fully described my improvement, what I claim therein as new and for which I desire to secure letters patent, is the employment of a cylinder containing a hydrometer, and with or without a thermometer, said cylinder being connected with a steam boiler, and constructed and arranged substantially as set forth, with a current of water passing from the boiler through it, which is kept always at the same height in the cylinder, by means of a waste pipe, as above described; and I further claim connecting said cylinder with the interior of the boiler by more than one pipe at different levels, so that the saltness at any level can be determined, substantially in the manner set forth.

WM. SEWELL, JR.

No. 6105.—*Method of regulating the supply of water to Steam Boilers.*

Having thus described my self-acting apparatus for maintaining the water in steam boilers at a uniform height, I here declare that I do not claim the float as part of my invention, the same having before been known and used in steam boilers; neither do I claim the chamber in which said float is placed, nor the crank on the float rod, nor in fact any such apparatus for regulating the height of water in boilers where motion is communicated directly to the cock-stem or valve spindle by the float, various modifications of such apparatus being well known.

But what I do claim as my invention and desire to secure by letters patent, is regulating feed in boilers by means of an arrangement of a float, a rocking shaft kept in constant motion by the engine, vibrating clicks, and circular or straight ratchets, acting upon the cock-stem, valve spindle, or pump shaft, so that the float is required to exert no direct force to regulate the supply; the whole machinery constructed and acting substantially as above described.

WARREN S. BARTLE.

No. 6106.—*Improvement in Wire Fences.*

I claim constructing the wrought iron wire fence substantially as herein described, that is to say, by forming the top and bottom rails and posts of the pannel of grooved bars, through which the ends of the wires of which the meshes are made are drawn and the ends turned down into said grooves, and then covered by other similar bars to hold them in place, by which a perfect finish is effected, and the expense and difficulty of riveting is avoided.

HENRY JENKINS.

No. 6107.—*Improvement in apparatus for heating by Vapor of Alcohol.*

Having thus fully described my apparatus for the economical use of fuel for heating purposes, what I claim therein as new and for which I desire letters patent, is the combination of a reservoir for holding the material to be burned, having a tube running through it in any convenient direction, with one or more small pipes or burners leading from the top thereof, and introduced in an angular direction near the bottom, as set forth, so as to cause the blaze therefrom to impinge on the side of the tube, the heat of the blaze causing a sufficient and constant supply of vapor to the burners, without the aid of an auxiliary heater, and all the surplus heat being directed through the tube to the top thereof for heating purposes.

I also claim, in combination with said burner or burners, one or more jets leading into the current issuing through the tube for increasing the heat, as herein specified.

THOMAS K. ANDERSON.

No. 6108.—*Improvement in self-acting Presses.*

We do not claim to be the first who have employed the gravity of a press, and that of the substance being compressed by it as its actuating force, this having been done by others in various ways; but what we do claim as our

invention and desire to secure by letters patent, is the combination of the cam lever *d*, and head *h*, constructed and arranged as herein described, with the platen, press beams, and parallel levers, whereby the platen is maintained in a horizontal position at every elevation, and the compression effected by the lever and cam, without passing pins through them as fulcra for them to turn on, thus avoiding the splitting of the levers and other arrangements, which are productive of so much inconvenience in presses heretofore constructed upon similar principles.

DAVID TYLER.
A. McKINNEY.

No. 6109.—*Improvement in Door Locks, by which one key hole serves for two distinct Keys.*

I therefore claim as new and of my own invention and desire to secure by letters patent of the United States, the application of such a key hole to receive a different key at each end, such keys acting singly or successively to withdraw or project the night or standing bolt, or act upon the latch bolt by the intermediate slide (*c*), as these are all applied and conjoined for these purposes, substantially as described and shown.

AMOS CALL.

No. 6110.—*Improvement in Compositions for Filling Teeth.*

We do not claim as our invention and discovery, the application of gutta percha alone to the stopping and filling of carious teeth, although we are not aware that it was ever so used until we commenced using it; but what we do claim, is the combination of gutta percha as a base with such other mineral, earthy, and metallic substances as will make such a compound, of such a character, and adapted to such purposes as we have described, viz: its combination with such of those substances as will shorten it and render it less tenacious, harden it and render it fit for a useful filling, and give it the desired color without any noxious quality and without destroying its plasticity when heated, and the application of the compound substance for that purpose.

ASA HILL.
SAMUEL G. BLACKMAN.

No. 6111.—*Improved Combination Revolving Tumbler Lock.*

What I claim as my invention and desire to secure by letters patent, is the combination of the sliding bolt with the rotating tumbler, substantially as described, for the purpose of locking the tumbler independently of the permutation stops, as described.

I also claim the turning plate, in combination with the sliding bolt and tumbler, substantially as described, by means of which the motions of the sliding bolt are regulated, and its combination with the tumbler effected, substantially as described.

I also claim, in combination with the tumbler and the sliding bolt, the employment of a key, which when inserted, will permit the sliding bolt, in unlocking the tumbler, to close up the key hole over the key, substantially as herein described, by means of which combination the tumbler must be locked to admit of inserting the key, and the key must be shut into the key hole to admit of unlocking the tumbler, substantially as herein described.

And finally, I claim, in combination with a rotating tumbler and the sliding

bolt by which it is locked and unlocked, the employment of the turning eccentric plate, which operates the sliding bolt, and at the same time also closes up the key hole, substantially as described.

LINUS YALE.

No. 6112.—*Improved Nipper Saw-set.*

What I claim therefore as my invention, is the improved organization above described, or in other words, the hand rest or handle B, the arm I, and screw K, the spring lever L, the jaws or bed A, and jaw *b*, of the lever L, the adjustable bed screw and arm C, in combination, the whole being constructed and made to operate together, substantially as specified.

JACOB MUZZY.

No. 6113.—*Improvement in Apparatus for removing Animals from Railroads.*

What I claim as my invention and desire to secure by letters patent, is—

First. The manner of avoiding destructive violence to the limbs and bodies of animals, by terminating the fingers of my machine with elastic rollers, rendering the fingers capable of a limited vibration to suit the action of those rollers, and placing above the fingers a moveable elastic cushion or buffer to receive the direct action of the animal, which may be thrown upon the fingers, substantially as herein set forth.

Second. I also claim making the front part or fingers of an oscillating life preserver, to raise by the act of encountering an animal on a railroad, in such manner as to lift the animal from its feet clear of the track, whereby the life and limbs of the animal are preserved, and the danger of throwing the train from the track is avoided, substantially as herein set forth.

Third. I also claim the arrangement of machinery herein described, composed of the cushion C, the sliding rods *g g*, the thrusting bar M, the trigger T, the latch bar D, the latch *o*, and the notch *q*, combined and acting to produce the effect of elevating the fingers of the railroad life preserver, when encountering an animal on the road, substantially as herein set forth.

Fourth. I also claim the arrangement whereby the fingers of a life preserver are, while in motion, made to receive at pleasure, a limited horizontal deviation from their ordinary line of direction, in order to arrest an animal near one side of the track, the same being effected substantially as herein set forth.

Fifth. I also claim, in combination with the T shaped frame and weighted oscillating frame of my life preserver, the jointed fingers, folding backwards, and the jointed rack frame and cushion withdrawn and folding forwards, to produce a compact stowage when in depot, in the manner substantially as herein set forth.

Sixth. I also claim the jointed revolving and elastic life preserver, herein described, combined with a pivot truck, having a circular bearing for friction rollers, and also having check arms for producing and limiting the horizontal motion of the fingers, substantially in the manner herein set forth; not intending by these claims to limit myself to the exact arrangement of parts herein described, but to vary the same at pleasure, while I attain the same ends by means substantially the same.

LOUIS MONTGILION.

No. 6114.—*Improvement in Setting Teeth.*

What I claim in the above described improvement as new and useful and desire to secure by letters patent, is the *mode and manner of securing the cylinder in its place*, by means of the perforated or solid screw passing through the bottom of said cylinder into an opening in the root of a tooth prepared to receive it.

F. H. CLARK.

No. 6115.—*Improvement in Water Wheels.*

What I claim as my invention and improvement and desire to secure by letters patent, is making the shell A, of the wheel, of the peculiar form described and represented, in combination with the circular plate B, central core C, and spiral buckets D D, discharging on the same side of the shell, arranged and operated in the manner and for the purpose herein set forth.

JAMES TREES.

No. 6116.—*Improvement in Spark and Gas Consumers.*

Having thus fully described the manner in which I construct my spark and gas consumer, and shown the manner in which the same operates, what I claim therein as new and desire to secure by letters patent, is the manner in which I have constructed and arranged the respective parts that constitute the inner and outer cases of the apparatus which is placed at the top of the chimney, and also the manner in which these are combined with the fire box; that is to say, I claim the manner of constructing and arranging the trumpet mouthed tube D, within the inner case, said tube being divided into two or more parts, and being made to deposit and discharge the larger portion of the sparks by the aid of the opening between said parts as described, substantially as set forth. I also claim the manner in which I connect the apparatus at the top of the chimney with the furnace or fire box by means of the tube or pipes H, the cases L L, and the openings thence into the fire box or furnace for the purpose made known. I likewise claim the manner of preventing the entrance of water into the fire chamber by the employment of the tubes M, in combination with the tubes H H'.

DAVID MATHEW.

No. 6117.—*Improvement in the Manufacture of Pearlash.*

What I claim as my invention, is the process of first roasting or heating the ashes, once dissolving and then pearling in the pearling oven, thereby saving the expense of the leeching apparatus and one boiling operation, in the manner described in the specification.

WM. A. EDWARDS.

No. 6118.—*Improvement in Apparatus for Warming Apartments.*

What I claim as my invention, is the combination of the vapor condenser with one or more radiators and the water chamber surrounding the furnace, also the arrangement of the said condenser and air inlet and outlet pipes of its external case, in such manner that the cold air, previous to its entrance into the air heating chamber, shall be brought to impinge directly against the condensing vessel.

I also claim the above described mode of making one or more of the sides of the radiator M, viz: serpentine in transverse section, essentially in manner and for the purpose as specified.

SAM'L WHITMARSH.

No. 6119.—*Improvement in Drying Machines.*

What I claim as my invention and that for which I desire to secure letters patent, is for a wheel divided into chambers, as described, open to the free circulation of the atmosphere around the periphery and through the passage P P P P, around the interior parts of the chambers, also for the purpose herein set forth. I do not confine my claim to the chambers formed of iron wires or rods, for some purposes wood would be preferable, neither do I confine my claim to four chambers in the wheel, but to two or more formed as described.

NELSON E. CHAFFEE.

No. 6120.—*Improved Block for supporting Bilges and Keels of Vessels.*

What I claim as my invention and desire to secure by letters patent, is the combination of the two legs and the horizontal table supported by them, with the palls at their feet, and the rectangular frame and its palls and ratchet, the whole to be acted upon by devices for giving a coincident motion of the legs towards each other, and constituting a support for the bilge or keels of vessels when taken in dock, not intending to limit myself to the precise form and number of the parts, or to the exact size as described, as it is obvious that four legs may be used instead of two, or that the number of palls and ratchets may be multiplied.

FRANCIS GRICE.

No. 6121.—*Improved Electro-Magnetic Ore Separator.*

What I claim as my invention and which I desire to secure by letters patent, is—

First. The use and application of a revolving cylinder or drum, with the poles of electro-magnets on its periphery, for and to the purpose of separating the magnetic oxide of iron from the substances with which said oxide may be found associated, by causing the said electro-magnets when revolving as component parts of such cylinder, to be successively charged to take up the ore and subsequently discharged to part with it, the charging being effected by bringing the windings of such electro-magnets in connection with an acting galvanic battery, and the discharging by breaking or leaving such connection.

Second. For the purpose of separating such ore, I likewise claim the use and application of four or more terminations to the poles of electro-magnets, as shown in fig. 3.

RANSOM COOK.

No. 6122.—*Improvement in Artificial Legs.*

What I claim as my invention and desire to secure by letters patent, are:

First. The combination of the horizontal arm with the knee bolt, connected with a cord and spring in such a manner as to possess a varying tendency to extend the flexed limb according to the position of the same, substantially as herein specified and described.

Secondly. I claim the use of a combination of the double coiled, recurved foot-spring with a bolt, and with downward and backward projecting arms, acting at once to flex the foot, and to extend the toes as herein set forth.

Thirdly. I claim the use of a combination of the stop bolt with a moveable heel as herein specified.

Lastly. I claim the manner herein described of connecting the toe-piece

with the foot when the said toe-piece is operated on by the cord *e*, and spring Q, to extend it in the manner and for the purposes herein set forth.

BENJ. F. PALMER.

No. 6123. — *Improvement in Horse Rakes.*

What I claim and desire to secure by letters patent, is the application of the crank levers D, D, and handle E, F, E, for rotating the rake-head in the manner and for the purposes described, for charging and discharging the rake.

SAMUEL H. GRINNELL.

No. 6124. — *Improved attachment of loading muzzle for Rifles.*

What I claim as my invention and desire to secure by letters patent is,

First. The hinge attachment for connecting the muzzle to the barrel.

Second. The application of the muzzle to and for the use of the muzzle thimble for the ramrod.

DANIEL SMITH.

No. 6125. — *Improvement in Fire-kindling materials.*

I make no claim to the use of turpentine in its crude or native state, as the great quantity of essential oil in proportion to the resin therein, prevents me from making a composition possessing the desirable qualities as above enumerated; but what I do claim, is the combination and use of the spirits of turpentine with the charcoal and other materials herein named, for the purpose of so softening the resinous materials of the composition as to enable them to adhere with tenacity after compression, and thereby to sustain the shocks incident to transportation, without fracture.

LEVI T. CHEEVER.

No. 6126. — *Improved method of attaching the arch to the Truss frame in Bridges.*

I do not claim as my invention the combination of an arch or arches with a truss frame, as this has long since been known; but what I do claim as my invention and desire to secure by letters patent, is combining the arch or arches with the truss frame by attaching it or them to the posts alone (in contradistinction to the diagonal braces) when the said posts are so connected with the chords as to admit of drawing them together without changing the position of the arch or arches, and of changing (by the same means) the position of the arch or arches relatively to the chords substantially as described.

J. DUTTON STEELE.

No. 6127. — *Improvement in Brick Presses.*

I do not claim any of the component parts of this machine, individually considered, nor do I claim the mixing tub and knives as used in making bricks or otherwise, but what I do claim as my invention and desire to secure by letters patent is,—

First. The combination and arrangement of the two horizontal circular revolving mould plates M, M, for moulding the brick with the tub B, revolving shafts and pressers H′, and conveying the brick to the discharging pistons *d*, *d*, simultaneously in opposite directions, the gearing being so arranged as to cause the rotating mould plates and reciprocating pistons to have the motions and pauses as herein set forth, for moulding and discharging the brick.

VALENTINE ROTH.

No. 6128. — *Improvement in short-slide valves by chamfering the corners.*

What I claim and desire to secure by letters patent, is the rounding or flattening of the corners, joining the sides of the steam ways in and the outer sides of the seat of the valve with its face; also the face of the valve or slide being joined to the sides of the steam cavity therein, and to its outer sides by corners rounded or flattened in the manner and for the purposes herein set forth.

JAMES MULBURY.

No. 6129. — *Improvement in self-acting Registers for stoves.*

What I claim as my invention and desire to secure by letters patent, is the arranging and combining the respective parts of my improved stove registering apparatus with each other, and with a stove in such a manner that the expansion and contraction of the stove itself (or the portion of it with which the registering apparatus is combined) shall operate the register or damper plate, and thereby regulate and govern the admission of air to the chamber of combustion; not intending by this claim to limit myself to any particular form of the respective parts of the registering apparatus, but to vary them as I may deem expedient, whilst I attain the same end by substantially the same means.

WASHBURN RACE.

No. 6130. — *Fluid Metre.*

What I claim as my invention and desire to secure by letters patent is,—

First. The within described machine or mechanical combination for the measuring or ascertaining the cubical, or other quantity of a fluid, that may pass, or be forced by mechanical or other means through it, with the self registration of the same, by means of a counter or other suitable contrivance, arranged and operating substantially as described; but I do not intend by this specification to limit myself to the precise arrangement of parts herein described, intending to vary it in any manner whereby results substantially the same to those herein described are produced.

Secondly. The making or leaving a sufficiency of space above or beyond the port leading into the chamber N, in the cylinder F, to allow of the piston G, to pass above or beyond the port, or any portion of it with the object or intent of providing an escape for the fluid forced into the cylinder from the feed pump, in case of the metre failing to act from an accident, by breaking of the rods, or from other causes.

Thirdly. The use of the pneumatic pump, or pumps, or springs, whether of metal or other material, for the purpose of assisting the return of the piston G, during the exhaust or upward stroke of the feed pump plunger, substantially in the manner and for the purpose herein described.

WM. HENRY LINDSAY.

No. 6131.—*Improvement in Machinery for turning right and left Lasts, &c. from the same pattern.*

What I claim as my invention and improvement and desire to secure by letters patent, is the herein described arrangement and combination of the vibrating beam and cutter wheels with the revolving centres, so as to produce at one time and from one pattern a right and left last, or a series of right and left lasts, or work of like character, substantially in the manner set forth herein.

SAMUEL HUNTINGTON.

No. 6132.—*Improvement in Apparatus for Current Wheels.*

What I claim as my invention and desire to secure by letters patent, is the manner of regulating the action of my re-action current wheel, by combining it with a wicker gate, of which the opening is regulated, held stationary or inverted with an inversion of current, in the way and for the purposes herein set forth.

I also claim the combination of vertical wings having inclined flanges passing under the floor of the channel leading to my mill, with the reversible wicker gate above described, substantially in the manner and for the purposes herein set forth.

I also claim the combination of machinery, by which I hold stationary the wheels of the governing apparatus of my wicker gate, not confining myself to the exact arrangement of parts herein set forth, while I effect the same purposes by means substantially the same.

JAMES SECOR.

No. 6133.—*Improvement in Churns.*

What I claim as my invention and desire to secure by letters patent, is the combination of the hollow cylinder dash B, perforated around its periphery near its lower or open end, with a number of small apertures for the air to pass through, and the central guide spindle D, and stationary cylindrical central block E, over which the cylindrical dash works, with the ordinary upright tub-churn A; the several parts being made, arranged and operated substantially in the manner and for the purpose above set forth.

CHARLES MURDOCK.

No. 6134.—*Improvements in Machinery for turning Irregular Forms.*

I therefore claim the above described manner in which I construct and operate the cutters of my improved machine, the same being represented in figures 5, 6 and 7, not meaning to claim cutter wheels as made and operated in the manner adopted by the said Blanchard, or as made to rotate in vertical planes passing respectively through the axis of the blocks to be cut or reduced.

I also claim the vibrating frame *h*, its shaft, pulleys and bolts in combination with the driving shaft and its driving pulley, the cutter carriage and its drums or pulleys U U U, the whole being made to operate together substantially in manner and for the purpose of imparting to the cutters a continual revolving power during the reciprocating rectilinear movements of the cutter carriage, as specified. And, furthermore, I claim in combination with the mechanism as above described for cutting or reducing the wood or block as specified, the mechanism by which said wood or each block and the pattern are partially and simultaneously rotated at regular intervals of time, for the purpose of bringing the cutters to act on a fresh surface or surfaces of the wood or block; the said mechanism consisting of the gear wheels on the pattern and block mandrils, the worm gears or screws, the shaft H, the pulley *c'*, and spring pall *e'*, the ratchet wheel, the weighted cord *b'*, lever *z*, stop *a'*, and projections *x y*, from the pulley *r*, the whole being constructed and made to operate substantially as specified. And although I have described and claimed certain improved mechanism, I do not intend to confine or limit my invention to the precise form or forms as above specified, but to vary the said form or forms in any manner and to any extent so long as I do not change the principle or principles of operation of my said improvements.

JAMES M. EDDY.

No. 6135.—*Improvements in Carding Engines.*

What I claim as my invention and desire to secure by letters patent, is the *cylinder A, surrounded or clothed with a spiral fillet of metal teeth*, in form of wire, or with teeth of metal of the form and description mentioned and described on the fourth specification, as arranged and employed in the third and fourth specifications, *in combination* with the main cylinder C, and with the cylinder B, or with the main cylinder only to *strip* and *clear* the *latter* by a self-acting contrivance, whilst the carding engine is in operation. I also claim the cylinder B, in combination with the cylinder A, and the main cylinder C, as applied to receive the strippings from the former and to deliver them to the latter.

J. DYSON.

No. 6136.—*Improved Cartridge Tube and Conveyor, forming a Fire-arm.*

Having thus fully described my improvements in fire arms, what I claim therein as new and desire to secure by letters patent, is—

First. The cartridge tube constructed substantially in the manner and for the purpose set forth; I also claim the tube *f*, for conducting the cartridges into the barrel, as above described.

Secondly. I claim the follower (*r*), for forcing forward the cartridges in the cartridge tube, in combination with said tube, in the manner set forth.

C. W. BUCHEL.

No. 6137.—*Improvement in Cooking Stoves.*

Having thus fully described my improved stove, what I claim therein as new and for which I desire to secure letters patent, is—first, the combination of the air chamber below the oven and the moveable pipe for conveying off the hot air, as above set forth. And lastly, I claim, in combination with the double flues, the projection (*m*) rising above the back flue before it contracts into the size of the pipe, arranged substantially in the manner and for the purpose herein made known.

JAMES L. NORTON.

No. 6138.—*Improvement in Flood Fences.*

I do not claim to be the original inventor of a hinged falling panel for a flood fence; but what I do claim as my invention and desire to secure by letters patent, is the combination of the hinged falling post B, with buoyant notched levers C, for letting down the panels by the rising of the water, acting on said buoyant levers, constructed, arranged, and operated substantially as above described for the purpose set forth.

I also claim the combination of the spring F, with the panel for holding the panel when thrown down by the flood, to prevent its being raised by the rising of the water as above described.

HENRY REICHERT.

No. 6139.—*Improved detached metallic Cartridge Tube, &c., for Fire-arms.*

What I claim as my invention and desire to secure by letters patent is—First, the hinged holder H, and cap I, in combination with the frustrum of

a cone metallic cartridge tube A, constructed, arranged, and operated in the manner and for the purpose above set forth.

DAVID MINESINGER.

No. 6140.—*Improved machine for dressing Nuts and Bolt-heads.*

Having thus described the construction, operation and comparative advantages of my machine for dressing the sides of bolt-heads and nuts, what I claim therein as new, and desire to secure by letters patent, is the combination of the twin cutters with the sleeves or other equivalent device for gauging their distance apart, and with the mandril upon which they are mounted, whereby the sides of nuts and bolt-heads are finished in less time, and with a machine of less size and cost than where only one cutter is used.

JULIUS KING.

No. 6141.—*Improvement in Presses.*

I do not claim the invention of a toggle joint press, but what I do claim as my invention and desire to secure by letters patent is,—

First. The before described combination and arrangement of the pulleys *n*, rope *p*, and central vertical shaft *o*, by which the power is applied beneath the centre of the follower in such manner that the rope in winding on the shaft, will not ride or touch the adjacent coils, and consequently will not be liable to wear, rub, or chafe — said rope being in a single length conveyed through an opening *o'*, in the shaft, and attached by its extremity to the connecting pins *m*, of the two toggles—the pulleys around which the rope is passed being arranged in pairs on the horizontal joint, or connecting pins *m*, of the toggles, outside the same, by which arrangement their diameter can be increased or diminished at pleasure, and the shaft being of the diameter of the width apart of the pulleys, so that the rope shall be drawn in straight parallel lines as described, to prevent rubbing against the flanges of the pulleys.

Second. I also claim the combination and arrangement of the hinged shutters L, with the followers for shutting the bagging and ropes into corresponding depressions in the sides of the same, so as to prevent them from getting out of place whilst the follower is descending as before described, preventing entanglements and derangement of the ropes and ends of the bagging in lowering the follower into the box.

Third. I likewise claim making the drag in the form of a segment of a circle, with a joint and key arranged and operated in the manner and for the purpose herein described and set forth.

Fourth. I also claim inclining the four hanging posts of the frame *b*, inward, by which the shoes *i*, of the toggles are sustained perpendicularly under the outer ends of the follower *l*, whilst the required length and width of the cotton box is obtained.

D. McCOMB.

No. 6142.—*Protector Slide for Door Locks.*

What I claim as my invention and desire to secure by letters patent, is the application to the ordinary rim lock, of a metal slide, which will at the same time cover the key hole, protecting the lock from being picked or opened from the outside; prevent the key from being turned by the application of instruments to the *pin*, or its dropping out by the slaming of the door, and retain

the knob spindle in a fixed position, rendering it inoperative upon the latch, thereby converting the latch into an additional bolt.

GEORGE F. J. COLBURN.

No. 6143.—*Improvement in Weavers' Temples.*

We claim as our invention the combination and arrangement of the following parts, viz: 1st, the jaws; 2nd, the arm B, and its joint pin; 3d, the lever G; 4th, the spring D; 5th, the tablet or support piece A; 6th, the arm I, with its spring M, and stud N; the whole being constructed and applied together as described, and so to operate essentially as above specified.

LEWIS K. DAY.
PRESTON DAY.

No. 6144.—*Improvement in Jaw Temples for Looms.*

What I claim as my invention is the cam *i*, and lever *f*, (applied to the breast beam) in combination with the inclined plane or cam *e*, projection K, or any mechanical equivalent therefor as connected with the lay D, the whole being applied to the temple and made to operate substantially in manner as above specified.

GEORGE DRAPER.

No. 6145.—*Improvement in Gas Apparatus.*

What I claim as my invention and desire to secure by letters patent is, firstly, the ribs or flanges *l*, around the retort; second, the passing of the lower end of the retort through the fire grate *m*, so as to connect it directly with the condenser; and thirdly, the immersing of the lower end of the retort in water or other suitable fluid; all of which being constructed, arranged and operating substantially in the manner and for the purposes herein above described.

AMARIA PIERCE.

No. 6146.—*Improved Metallic Packing for Pistons.*

What I claim as my invention and desire to secure by letters patent, is the making of metallic packing for the pistons of steam engines, of two cut rings, one within the other, the outer and the inner peripheries of the compound ring being concentric, and the division between them eccentric, substantially as herein described. When this is combined with the mode of keeping the two rings with their thickest parts on opposite sides of the common centre, by the projecting pin attached to the outer ring and the plate embraced by the ends of the outer ring, to cut off the passage of steam, substantially as described.

WM. WRIGHT.

No. 6147.—*Improvement in the manufacture of Hubs and Axles.*

What we claim as our invention and desire to secure by letters patent, is the method, substantially as herein described, of making the hubs of carriage wheels, by forming the inner box and outer case or surface of sheet metal, and uniting them by filling the inner space with cast iron, by running the molten iron in between them, as described; and in combination with this method of forming the hub, we also claim the method of securing the spokes by inserting their inner ends in the outer case of the hub, that the cast iron within the hub may run around and secure them in place, substantially as described.

And we also claim the method of forming the axles of carriages, by making

the outer form of the arm of the axle of sheet iron, when this is united to the steel or wrought iron axle within, by means of iron cast in the space between the two, substantially as described.

STEPHEN R. HUNTER.
MEAD MERRILL.

No. 6148.—*Improvement in machinery for separating Flour from Bran.*

Having thus fully described the construction, arrangement, and operation of the several parts of our machine, we will now add that we do not mean to claim to be the original inventors of a cylinder, nor of a combined punched and reticulated cylinder, nor of a cylinder covered with strips of punched sheet iron and strips of leather filled with tacks, such as are used in smut machines, nor the arrangement of gearing by which the machine is propelled; but we do claim to be the original and first inventors of the combination and arrangement of the external upright stationary close cylindrical case B, with the internal combined punched and reticulated upright stationary scourer and bolt B^1, B^3, and revolving cylindrical scourer and blower C, constructed, arranged and operated in the manner and for the purpose herein fully set forth, by which the fine flour that usually adheres to the bran, after being subjected to the first bolting operation, is now completely separated from the bran and collected in the annular space between the cylindrical bolt and cylindrical case, from whence it descends through the segmental openings in the horizontal base, upon which the said bolt and case rest, into conducting spouts, as aforesaid, whilst the bran is blown from the interior of the bolt through a spout leading through the external case, as aforesaid, in the meshes of the bolting cloth, being kept open by the pressure of air produced inside the combined cylindrical scourer and bolt, by the manner in which the oblique and radial and parallel wings are arranged on the revolving, scouring and blowing cylinder, as above set forth.

ISSACHAR FROST.
JAMES MONROE.

No. 6149.—*Improvement in Suspending Telegraph Wires.*

Having thus fully described our improvement and its modification, what we claim therein as new and for which we desire to secure letters patent, is suspending telegraphic wires across rivers by means of a stretched gum elastic band or tube, substantially in the manner and for the purpose set forth.

ELIJAH PRATT.
RAYMOND GRAVEREND.

No. 6150.—*Improvements in Brakes for Cars.*

What we claim as our invention is the stationary support plate, (composed of one plate or two plates E F,) the hinged flap G, and the confining bolts I K, (or other mechanical equivalents,) in combination together and as applied to the brake lever, and made to sustain the rubbing piece of wood D, substantially in the manner and for the purpose as herein before specified.

WILLIAM STINEHART.
JOHN TAGGART.

No. 6151.—*Improvement in Horse Rakes.*

What I claim as my invention and desire to secure by letters patent, is—so making horse rakes, by hanging the head or heads on one common rod or pivot, 2, as to allow each tooth to have a separate and independent movement, to enable the rake to pass over small as well as large obstructions, without disturbing the action of any of the contiguous teeth beyond the obstructing body.

CALVIN DELANO.

No. 6152.—*Machine for trimming, smoothing, and folding Cotton Cloth.*

We lay no claim to the mere use of a revolving brush, but that which we do claim is the afore described new organization of horizontal and vertical cylindrical brushes and a set of draw rollers, as arranged, combined and operating together, substantially in manner and for the purpose as above designated.

We also claim the revolving cylindrical brushes, (either with or without the vertical brushes,) the set or system of draw rollers, and the folder or folding apparatus, in combination with one another, and as arranged and operating together, substantially in manner and for the purpose as herein before explained.

JOHN HIGGINS.
HIRAM H. HIGGINS.

No. 6153.—*Improvement in Looms for weaving Brussels Carpets, &c.*

Having fully described my improvement, what I claim as new and desire to secure by letters patent, is the toothed guides *i' i' i'*, employed in the manner and for the purpose above set forth, or in any other way which shall accomplish the same end by analogous means.

I also claim the combination of the toothed guides, *i' i' i'*, with the wire-box, or trough, *n*.

ERASTUS B. BIGELOW.

No. 6154.—*Punching Machine, with a combination of Adjustable Gauges.*

Having thus fully described my improved punching machine, what I claim therein as my invention and desire to secure by letters patent, is the combination of the graduated scale rods T T, and adjustable gauges U U, with the moveable gauges *p p*, and also the combination of the said graduated scale rods and adjustable and moveable gauges, with the series of dies and punches, substantially in the manner and for the purpose herein set forth; not intending by these claims to limit myself to the exact form, proportion and arrangement of parts as herein represented and described, but to vary the same as I may deem expedient, whilst I attain the same end by means substantially the same.

RICHARD S. TILDEN.

No. 6155.—*Improvement in Fire Escapes.*

What we claim as our invention and desire to secure by letters patent, is the manner of bringing the upright or vertical jointed bars (*b*,) of the frame work herein described, into their erect position by means of the tumbling shaft (*v*,) slot (*l*,) pin (*s*,) arm (*t*,) and flap (*f*,) when acted upon by the horizontal frames which are moved towards each other by a right and left hand screw (S,) or other equivalent machinery for the purposes herein set forth.

We also claim the manner of bringing into their position on the notched revolving block (G,) and of sustaining thereby, the vertical jointed bars (*b*,) as likewise that of removing the feet of the uprights from said blocks when the frame is to be lowered, in the manner and for the purposes substantially as herein set forth.

GEORGE. A. W. HUTTMANN.
GEORGE KOCH KORNELIO, Jr.

No. 6156. — *Improvement in Stoves for heating Apartments.*

What we claim as our invention and desire to secure by letters patent is,—

First. Admitting atmospheric air to the throat which forms the communication between the chamber for the combustion of the fuel, and the drum that the inflammable gases evolved from the combustion of the fuel in the fire chamber, may be mingled therewith in passing through the said throat, and be thereby effectually inflamed, and pass in an inflamed and inflaming state into the drum as described.

Second. We claim making the lower aperture of the throat that forms the communication between the fire chamber and drum, larger than the upper aperture thereof, substantially as described, that the inflammable gases and atmospheric air may be the better commingled in their passage through the throat, and thereby insure a more perfect combustion as described.

And finally, we claim making the said throat substantially as above described, with an enlargement between the upper and lower apertures thereof, that the gases that enter the said throat may have room to mingle with the supply of atmospheric air before they pass up and out of the smaller aperture above into the drum, as described.

JAMES SHIELDS.
JAMES COLE.

No. 6157. — *Improvement in the delivery and take-up motion of Looms.*

What I claim as my invention, is the combination of a set of two or more feed rollers and mechanism for operating them as described, with the yarn beam and take-up motion or mechanism of the loom; the whole being arranged and made to operate together essentially, as specified, the said feed rollers serving not only to firmly hold the warps under the beating up action of the reed, but to deliver them out at the rate required.

AMOS H. BOYD.

No. 6158. — *Improvement in Cotton Presses.*

Having thus described the construction and operation of my improved cotton press, what I claim therein as new, and desire to secure by letters patent, is the combination of the moveable end board *b*, its guides *i*, and supporting wedges *c*, with the moving packing box G, and stationary platen F, substantially in the manner and for the purposes herein set forth.

I likewise claim constructing the press box with the upper part of its sides and ends slightly inclined outwards, in the manner and for the purpose herein set forth.

THOMAS ASHCRAFT.

No. 6159. — *Improvements in the let-off motion of Looms.*

What I claim as my invention, is the combination composed of the gear *g*, screw *f*, shaft *z*, ratchet wheel *d'*, pawl *e*, lever Y, bar X, a bent lever composed of the arm V, shaft W, and arm *i*, or otherwise properly made, roller *k*, one or more cams *m*, *n*, the spring *c'*, the slide plate Q, and arm P, and weight W, as applied to the warp beam or roller, and made to operate together substantially as above specified.

And I also claim in combination with the above described mechanism for operating the warp roller, the stop motion or mechanism applied to the same, and the spring stop lever H, of the loom, the said stop motion consisting of the shaft *t*, and its arms *u*, *v*, rod *y*, notched lever *o*, and its spring *r*, the whole being constructed and made to operate substantially as above explained.

JEREMIAH MYERS.

No. 6160. — *Improved Spike Machine.*

What I claim as my invention and desire to secure by letters patent, is the combination of the dies T Y V W U R L, gauge G, holder B', and cutter C^5, arranged and operating substantially as above described, for making wrought spikes from a spike rod in a cold or heated state, the spike rod being flattened at one end, and the spike gauged, pointed, headed, and discharged at every revolution of the cam shaft B, as herein fully set forth; and this I claim, whether the several parts be arranged precisely in the manner above described, or in any other mode or manner, which may be substantially the same, and by which analogous results shall be produced.

MARCUS MAXIM.

No. 6161. — *Machine for cutting teeth of bevelled Gear.*

What I claim as my invention and desire to secure by letters patent is,—

First. The method of cutting the cogs of bevelled wheels by means of a reciprocating cutter that moves in or on a slide (or slides) that vibrates on an axis that coincides, or nearly so, with the apex of a cone representing the bevel of the wheel to be cut, substantially as herein described, by which vibration the depth of cut is determined; and this I claim, irrespective of the adjustment of the axis of vibration, as described.

Secondly. I claim the guide bar (or its equivalent) on which the cutter carriage runs, and having its axis of vibration for the depth of cut, as above described, when combined with a secondary frame jointed to the main frame at some point outside the circumference of the wheel to be cut, that the machinery may be adapted to the cutting of cogs on various bevels, substantially as described.

Thirdly. I claim, in combination with the guide bar, having an universal joint, or the equivalent thereof, and operated substantially as described, in combination with the guide plate, to guide the cutter and determine the form of the face of the cogs, as described.

And, lastly. I claim making that part of the guide bar which rests against the guide plate, to determine the form of the face of the cogs, separate from and moveable on the guide bar, and properly bevelled to relieve and clear the cutter for its back movement, substantially as described.

GEORGE H. CORLISS.

No. 6162. — *Improvement in Cut-off and working the Valves of Steam Engines.*

What I claim as my invention and desire to secure by letters patent, is—

First. The method, substantially as described, of operating the slide valves of steam engines, by connecting the valves that govern the ports at opposite ends of the cylinder with separate arms of the rock shaft, or the mechanical equivalents thereof, so that from the motion thereof the valve that keeps its port or ports closed shall move over a less space, while its port (or ports) is closed, than the one that is opening or closing its port or ports, and *vice versa*, while at the same time the two arms by which they are operated have the same range of motion, as described, whereby I am enabled to save much of the power heretofore required to work the slide valves of steam engines, and by which also I am enabled to give a greater range of motion to the valves at the periods of opening and closing the ports to facilitate the induction and eduction of steam, as specified.

And, lastly. I claim the method of regulating the motion of steam engines, by means of the centrifugal regulator, by combining the said regulator with the catches that liberate the steam valves, by means of moveable cams or stops, substantially as described.

GEORGE H. CORLISS.

No. 6163.—*Improvement in Drying Grain.*

What I claim therefore as my invention and desire to secure by letters patent, is the method of drying grain in an open stationary pan, having the fire and draft below it, with the rake above for stirring the grain and causing it to pass from the feeder to the delivery, substantially as described, whereby the moisture in the grain is more readily evaporated and liberated, and the apparatus constructed at less cost and with less liability to derangement than by any other plan before known, when this is combined with the feeder heated by a hot air chamber, substantially as described, whereby the grain is gradually heated in the feeder to draw out the moisture before it is exposed to a higher temperature in the pan to be evaporated, as described.

HENRY QUINN.

No. 6164.—*Improved Tubular two part Rail.*

I do not claim a compound two part rail, with alternating cross joints, but what I do claim and desire to secure by letters patent, is the forming of each part of a two part compound break-joint rail, as above described, so that when bolted together with a vertical joint they form a tube; and I also claim, in combination with said rail, a core of iron inserted at each semi-cross joint in the hollow of such a rail, with the view of obtaining equal strength at those points with any other part, and of holding each part in its place vertically at the cross joints.

I claim the stanchion to be bolted or nailed to the side of the sleeper for the support of the rail, constructed substantially as herein described.

JOHN ELGAR.

No. 6165.—*Improved Door Lock, by a combined Key and Gauge—also a Thief Detector.*

What I claim as my invention and desire to secure by letters patent, is the thief detecting slide, in combination with the tumblers and the protuberance, and the springs and levers by which it is operated, and the key gauge or register, in combination with a key having sliding bitts, constructed substantially in the manner used and for the purposes herein described.

FRANCIS CHARLES GOFFIN.

No. 6166.—*Improvement in Rope Machinery.*

What I claim as my invention and improvement on my patented machinery for making cordage, is—

First. The manner of producing and diminishing the friction on the bobbins, so as to keep up a uniform strain on the strands as they are drawn off, also to prevent kinking and too fast unwinding, as hereinbefore described and represented, or other mode substantially the same.

Second. I likewise claim the employment of the sliding toothed ring and endless chain, in combination with the toothed pulley *y z*, and perforated wheel, friction bars, spring and screw, for graduating the friction on the toothed band, to cause the reel to wind up the rope as fast as delivered from the expansive and contractile pulleys, as above described.

WILLIAM JOSLIN.

No. 6167.—*Improvement in Cultivators.*

What I claim as my invention and desire to secure by letters patent, is connecting the teeth of cultivators to the frames thereof, by attaching them to blocks adapted to slide in the frame, and provided with screws for regulating their position relatively to one another, and to the draft beam, substantially as described;—and in combination with the foregoing,

I also claim as my invention, connecting the teeth by means of a hinge or other turning joint, and provided with the jointed screw brace, the said joints and screw braces being attached to the sliding blocks to which the teeth are attached, as described.

JEREMIAH WARNER.

No. 6168.—*Improved Horizontal Spark Arrester.*

Having thus fully described my improved spark arrester and its application, what I claim therein as new and for which I desire to secure letters patent, is a cap or horizontal pipe, with perforated top, expanded, and connecting with the fire box, substantially in the manner and for the purpose set forth.

T. WILLIS PRATT.

No. 6169.—*Improvement in Double Scale Balances.*

What, therefore, I claim as my invention, is the graduated scale E, and sliding or moveable weight F, thereof, in combination with the balance beam, (having arms of equal lengths,) and its two scale pans or platforms for sustaining weights, the whole being constructed and made to operate, substantially in manner and for the purpose as herein above specified.

THADDEUS FAIRBANKS.

No. 6170.—*Improvement in Apparatus for operating Shuttle Boxes of Looms.*

What I claim as my invention and desire to secure by letters patent, is the combination of the index wheel (A,) having moveable pins of different lengths with the shoe (B,) having projections adapted to the pins for the purpose of raising and falling the shuttle boxes, the whole being constructed substantially as above described.

ROBERT BURNS GOODYER.

No. 6171.—*Improved Combined Railroad Bar.*

I do not claim as of my invention the use of mere clamp plates and screw bolts for the union of the sections of rails or bars of railroads. I am also aware that rails have been made in two or more parts divided by a longitudinal plane or planes; but when so made the upper part constituting a cap is made separate from and attached to the base, and I do not therefore simply claim making rails in two parts when the top part depends alone on the bolts to keep it down; but, what I do claim as of my invention and desire to secure by letters patent, is making such rails in two parts divided by a longitudinal and vertical plane when brought together and united by breaking joints, and secured by screw bolts, keys, or their equivalents, so that the junctions of the sections of one part shall be in the middle or near the middle of the sections of the other part, substantially as described.

And I also claim making a recess or groove at the junction of the two parts of the rail at the top, substantially as described, that the iron when beaten down by the action of the wheels of railroad trains may spread therein without having a tendency to force apart the two halves and strain the securing bolts or keys, as described.

ALFRED B. SEYMOUR.

No. 6172.—*Improvement in regulating Forebays.*

What I claim as my invention and desire to secure by letters patent, is the method of regulating the supply of water from one and the same forebay, to different water wheels or other movers of machinery driven by water, by means of a partition or partitions over which water not required for the steady action of one wheel, or series of wheels, may pass to one or more other wheels which do not require constant and invariable supplies, in the manner and for the purposes herein set forth.

I also claim the use of the above manner of regulating the water of a forebay by partitions, in combination with one or more swinging gates attached to said partitions, so adjustable as to regulate, change or reverse the course of the currents of water, and also in combination with the regulating waste gates, herein described, acting in the manner and for the purposes herein set forth.

HENRY MALLOW.

No. 6173.—*Improvement in Spring Shanks for Boots and Shoes.*

I do *not* claim the invention of a metallic shank for boots or shoes, but *what I claim* as my invention and desire to secure by letters patent, is the position of the slot *f*, and sliding part of the spring shank within the boot or shoe heel, for the purpose of being protected from injury, in the manner and for the purpose described.

JOHN McGINLEY.

No. 6174.—*Improvement in Balances for weighing.*

What I claim as my invention, is the afore described improvement or combination as applied to a scale beam, and composed of the following elements, or their mechanical equivalents, viz: 1st, the suspended platform D; 2d, the series of one, two, or more weights Q R S; 3d, a lowering and lifting apparatus, the same consisting of the cone K, slide bar P, and catch T, as specified, the whole being combined and made to operate together in the manner and for the purpose as above explained. And in combination with said lifting and lowering apparatus, I claim the scale of figures on the slide bar P, and the hole *m*, made through the post H, or their equivalents, the same being for the purpose described.

ROBERT EASTMAN.

No. 6175.—*Improvement in Cotton Presses.*

I do not claim the frame steam cylinder, cogged piston rod, nor cogged eccentric levers for compressing bales of cotton by steam power; but what I do claim, is—

First. The combination and arrangement of the circular revolving platform A, and radial presses G H I, for conveying uncompressed bales of cotton or other substances *to* the steam cylinder, to be compressed simultaneously with the operation of conveying compressed bales *from* the steam cylinder to be tied, by which all the hands attending the various parts of the machine are kept constantly employed during the operation of the steam engine, whether the revolving circular platform be made, arranged and operated in the manner herein described, or other mode which may be substantially the same.

Second. I claim the combination and arrangement of the jointed arms T^1 T^2 T^3 T^4, levers W W, slotted arms *b*, and triangular plates *d*, as connected with the follower I, and head block G, operating in the manner herein set forth, for preventing the descent of the follower I, when detached from the lifting hooks R, of the steam engine, before the ropes are tied.

Third. I claim the mode of conveying the ropes for tying the bales, through the grooves of the head and tail block by means of the conveyors M, during the operation of compressing a bale simultaneously with the ascent of the follower I; and then returning the conveyors M, to their original positions simultaneously with the descent of the said follower I, by means of the combination of the conveyors M, rollers K K′, and cords attached to the same, arranged and operating in the manner above set forth.

Fourth. I claim the manner of employing the four upright pillars H, with shoulders in combination with the head block G, follower I, and circular revolving platform A; said pillars being arranged and operating in the manner described for the purpose of supporting the head block G, in such manner that it can accommodate itself to the position of the pendant head block *f*, during the operation of compressing, without deranging or straining the platform A, said pillars playing loosely in boxes *r*, let into the platform on which the shoulders rest whilst adjusting the bale for compressing.

WM. J. JOHNSON.

No. 6176.—*Improvements in Rope Machinery.*

As to the above described machine, I make no claim to the one general principle involved in the combination of a drawing and stretching apparatus, with reels revolving on the planetary system, for the purpose of making cordage or ropes, inasmuch as a machine involving that general principle has been in use in England for several years; nor do I claim to have invented the tubes, adjusting plates, or press-blocks, individually considered, but confine myself to the following specific claims, as being new and useful improvements upon the English rope machine, viz:

What I claim as my invention and desire to secure by letters patent are,—

First. I claim the placing each reel at such an inclination towards the point of "laying" or combination, as that its whole axis shall be in a direct line with its strand after it leaves the tube, and is beginning to be combined, and so that the tubes of the respective reels shall be almost in contact at their upper ends, just immediately below the nipper blocks; the tube on each reel being a part of and a direct continuation of the axis of its respective reel.

Second. I claim the placing of the reels also at a suitable angle of inclination from the right or left of the rope, so that the strand as drawn out of each tube, has a direction towards the outside of the rope, viz: should a right line be drawn lengthwise through the centre or axis of either reel, and continued, it would be in the centre of its strand also onward to that side of the rope upon which it is being laid, and from which the tube recedes when carried round upon the vertical shaft.

Third. I claim the use of a concave stationary driving wheel, connecting with the reels by pinions above the bobbins, for giving the necessary counter motion to each reel, as they are carried round by the vertical or main shaft.

Fourth. I claim the two thumb screws and elastic levers, substantially as herein described, in combination with the tubes arranged as above described, for giving the nipper blocks a more steady and regular pressure or grasp upon the rope.

Fifth. I claim the application of the adjusting plate between the press block and tube, the same being secured by means of the mortise or opening through the shaft, and the grooves therein, within which it is made to slide substantially as herein described. BENJ. MORISON.

No. 6177. — *Improvement in Cooking Stoves.*

What I do claim as my invention, and desire to secure by letters patent, is extending the hot air chamber under the fire grate when the top plate thereof is so inclined or curved as to discharge the ashes that fall thereon from the grate, that the said air chamber may be heated by a radiation from the fire on the grate above, substantially as described.

I also claim making the hot air chamber in two compartments, by a partition perforated at or near the middle of its length, in combination with the perforations in the back plate of the back chamber, or front of the oven, and near the ends thereof, substantially as described, that the air which enters the chamber through holes in the sides of the stove may be forced to circulate through the hot air chamber to be heated, before it enters the oven near the sides thereof, as described.

And finally, I claim in combination with the method herein described of heating the top of the hot air chamber, the extension of the bottom flues of the stove, that the products of combustion in passing around to enter the return flue, may pass under the bottom plate of the hot air chamber, and thus aid in heating the air therein, as described.

GEO. E. WARING.

No. 6178. — *Improvement in Curry Combs.*

What I claim as my invention, is the mode of making curry combs by constructing their body and teeth out of one solid sheet, or piece of metal, by so cutting and bending the said sheet or piece of metal, as set forth in the above specification, that without any material waste, and without the combining and riveting, or fastening together separate and detached portions of the structure, I do make a complete body and teeth for the comb.

I also claim the entire form and combination of the parts to form such a comb as is described and illustrated in and by the said specification and drawings. ANDREW HOTCHKISS.

No. 6179. — *Improvement in Ploughs.*

What I claim as my invention and desire to secure by letters patent, is the constructing the share and point of my improved plough of a diamond shaped flat plate of metal (B,) placed under the mould board (C,) and combined therewith, and with the flange 3, and standard 1, (of the casting A,) in such a manner that the share-plate (B,) can be moved forward to a proper position, as its operating point or share-edge wears away by use, without producing the slightest change in the form or position of the winding concave face of the mould board, substantially as represented and described herein, and for the purpose set forth. WILLIAM T. SPROUSE.

No. 6180. — *Improved Furnace for smelting Zinc.*

I do not claim to be the inventor of retorts or muffles, pots or cylinders, or chambers in furnaces, to receive them for distilling or volatilizing zinc, or any of the modes now in use, where the heat is generated in the chamber with the retorts or muffles, or generated in a fire place, and pass into a chamber containing pots, cylinders, muffles or retorts, heating the sides of the furnace and flues and walls of the chamber, which serve only to confine the heat round the retorts; these heated walls allow much caloric to pass away without coming in contact with the ore, and require from ten to twenty tons of coal to produce a ton of metallic zinc.

What I do claim as my invention, and desire to secure by letters patent, is a combination or double retort or furnace, generating the heat within the vessel or chamber containing the ore to be heated, surrounding the fire chamber or place of combustion with the ore, so that the caloric going off in any direction from the fire (except down through the grates) must pass through the ore. With this arrangement, merchantable metallic zinc is obtained from the ore, in the proportion of one ton of zinc by four and one fourth tons of coal.

SETH BOYDEN.

No. 6181.—*Improvement in Curry Combs.*

Having thus fully described my improvement, what I claim as new and desire to secure by letters patent, is the shank constructed with the fastening hole therein, made without drilling or welding, and combined with the comb as herein above described, so as to act as guards to the ends thereof.

WM. BEACH.

No. 6182.—*Improvement in Smoke Consuming Apparatus.*

What I claim as my invention and for which I now claim letters patent, is:

First. Combining with the blowing wheel which forces the blast into the furnace, and which receives a portion of the products of combustion from the furnace, an auxiliary blower or blowers to insure the requisite supply of atmospheric air to the main blowing wheel, substantially as described.

Second. I claim connecting and combining the damper that governs the blast pipe with the dampers that govern the apertures through which the products of combustion enter the fan blower, for the purpose and in the manner substantially as herein described.

And lastly, I claim making the case that contains the gravel, or other impeding medium of a double cylinder or prism of wire gauze, or the equivalent thereof, when this is so combined with the chimney as to prevent the escape of the products of combustion, except through the interstices of the said impeding medium, substantially as described.

F. P. DIMPFEL.

No. 6183.—*Improvement in Grain Gatherers.*

I do not claim to have invented any of the parts herein described and shown, irrespective of the uses to which I have herein put them; but what I do claim as new and of my own invention and desire to secure by letters patent of the United States, is the application and use of the foot lever E, acting through the hinges *e e*, to give a motion to the fingers or teeth *b b*, indepen-

dent of the motion of the handles *ff*, for the purpose of throwing the grain into a position over the handles *ff*, and arms *d d*, whereon it may be readily bound into bundles, as described. WM. HERRIES.

No. 6184.—*Improved Door Lock.*

What I claim as my invention and desire to secure by letters patent, is—

First. The talons as constructed on the end of the lever 2, herein described, by means of which and the connecting tumbler 3, when acted upon by the key, the fallers are prevented from acting upon the bolt.

Second. The interposition of a metallic plate over the keyhole in the manner represented at fig. 2, in combination with the lever 5, the spring *z*, upon it and the notches in the rim of the lock.

Third. The pin *l*, of the night latch constructed so as to revolve in its socket, all as herein set forth. S. M. PYE.

No. 6185.—*Improvement in Planing Machines.*

Having thus fully described the parts and combinations of parts of our invention, with the modes in which we contemplate applying the same—

What we claim as our invention and desire to secure by letters patent, is the combination, arrangement and construction of the double cams P, the eccentric clamps M and M, and the rockers N and N, for the purpose of producing an uniform, continuous and parallel feed motion without rollers, rack and pinions, endless chains, or any common device, by which means we produce a parallel feed motion, without the expense and friction of ways or slides, whether applied to planing machines, or for any other purpose, substantially as described and shown.

Also, the construction of the fence D, or any analogous device against which to spring or curve a board to be planed, in combination with screw clamps, or gauges, with proper contrivances I and J, or other means adapted to the curve on the fence D, extending each way from the centre of the curve and disk, embracing each line of the fence as far as may be necessary, for the purpose of receiving the board or plank, by clamping or otherwise acting upon the edges, while it is on the front line of the fence, holding and directing it around the curve, springing and presenting each portion of the board, successively to the action of the finishers on the disk, on a curve, and also preventing the finishing portion of the surface from coming in contact with the knives, on the back part of the disk as it passes out of the machine on the rear line of the fence, substantially as described and shown.

Also, the combination of the armed fence H, and gauges I and J, or any other device for springing and presenting a board or plank on a curve to the action of planes or finishers on a disk, with the disk E, and long or broad finishers F, to extend across the board the entire width, and at right angles with the shaft *c*, for the purpose of planing boards and plank when presented on a curve, thereby finishing them while cutting with the grain, and leaving no circular marks or scores across the board or plank, in the manner herein before substantially described and shown.

The effects of these improvements are the production of a new parallel feed motion without the friction and expense of ways or slides; and also a new method or principle of presenting a board or plank to the action of the knives or finishers revolving on a disk on a curve, by which means the finished surface is made, while the finishers are cutting with the grain of the wood, thus converting the disk or Bramah wheel, which has hitherto been comparatively of little worth, into a most useful and valuable machine. The tendency of the planing operation with the disk is to move the board edgewise in the same plane in which the knives revolve, in contradistinction to the Woodworth cylinder, which tends to lift the boards directly up from its bed as it cuts up and out from the reduced or planed, to the unplaned surface, as declared in said Woodworth patent.

DANIEL BARNUM.
THOS. J. WELLS.

No. 6186.—*Improvement in Looms for weaving Brussels Carpeting, &c.*

Having fully described my improvements in the foregoing specification, what I claim as new and desire to secure by letters patent, is—

First. The moving the trough or grooved bar *f'*, forwards towards the face of the cloth, when between the warps, for clearing the shed, in the manner above described.

Secondly. I claim the said trough or grooved bar *f'*, in combination with the lathe of the loom, whether said lathe be constructed with two pairs of swords, as above described, or in any other way which shall give to the race beam a counter motion, or move the said trough or grooved bar *f'* forward between the warps, for the purpose and in the manner above set forth, or in any other way which shall accomplish the same end by substantially the same means.

E. B. BIGELOW.

No. 6187.—*Improved Spiral Spark Arrester.*

Having thus fully described my improved spark arrester, what I claim as my invention and desire to secure by letters patent, is the combination of the chamber containing the wings *c'*, and wings *h*, with the openings *x*, and volutes *e*, in the manner and for the purpose described; by means of which I am enabled to make sufficient eddies and throw down the sparks more perfectly than by any other arrangement with which I am acquainted.

ANDREW M'CLEARY.

No. 6188.—*Improvements in apparatus for Dressing Cloth.*

What we claim as our invention and desire to secure by letters patent, is the combination of the rotary brushes, shears, steaming apparatus, polishing velvet roller, and other parts, as herein described, with the polished convex, metallic rubbers, whereby all parts of the process of finishing a piece of cloth, after it leaves the fulling mill, are simultaneously and continuously performed.

JOHN JOHNSTON.
JOHN D. SNYDER.

No. 6189.—*Improvement in Cotton Batting.*

Be it distinctly known, that we do not claim as our invention the mode of operating a series of carding machines, the one before the other, to make batting, as shown by J. Essex's drawings, nor any part of the above described machine. What we claim as our invention and discovery, is the method of laying on and covering the entire upper and lower surfaces of cotton batting that has been merely well picked and spread in a lapper, with a thin sheet or layer of carded cotton, for the purpose of making it smooth and strong,

thereby fitting it for being packed and pressed and used for batting purposes, such as beds, mattrasses, &c.

H. B. LAWTON.
HIRAM T. LAWTON.

No. 6190.—*Improvement in apparatus for Raising and Tilting Water Buckets.*

What we claim as our invention and desire to secure by letters patent, is the combination of the vibrating arms *i, i,* with the cog wheels *f, f,* of the crank shaft, in such a manner that by the lengthwise movement of the crank shaft, one of the arms (*i,*) is thrown into, and retained in a horizontal position, for bearing against the rope of the ascending bucket to steady the same; and also in combination with the strap *s*, by which the bucket is connected with its rope, serving to turn and guide the bucket so that it will be caught and capsized by the tilting bar *j*, substantially as herein set forth.

HARVEY W. SABIN,
LUTHER B. BENTON.

No. 6191.—*Improvement in apparatus for Raising Water.*

What I claim and desire to secure by letters patent, is raising water by centrifugal force, produced by a combination of inclined planes and fans attached to a shaft, as herein described, using any combination of inclined planes or fans to produce the intended effect.

WILLIAM T. BARNES.

No. 6192.—*Improvement in apparatus for drawing Water from Wells.*

What I claim as my invention and desire to secure by letters patent, is the mounting the driving pinion K, and the auxiliary reversing pinion L, which is geared thereto in bearings M, N, rising from the vibrating tumbler R, which tumbler is combined with and operated upon by the inclined planes W and V, rising from the sliding bar T, (through the medium of a lever,) substantially in the manner and for the purpose herein set forth; not intending by this claim to limit myself to the exact proportion and arrangement of parts, as herein described and represented, but to vary them as I may deem expedient, whilst I attain the same end by means substantially the same.

JEHIAL T. FARRAND.

No. 6193.—*Improvement in Tide Water Wheels.*

What I claim as my invention and desire to secure by letters patent, is the arrangement of the shaft E, in an inclined position, so that while the buckets of the water wheel dip in the water on one side of the wheel those of the other side become elevated above the surface, in combination with the water wheel and with the horizontal revolving platform, whereby the position of the water wheel is occasionally changed, without disconnecting the gear wheel F, from the wheel or pinion N, as herein fully set forth and described.

FREEMAN F. MYRICK.

No. 6194.—*Improvement in Steel Yards for Weighing.*

The combination we claim and consider as our invention consists as follows:—First. The steel yard and scale pan, or any equivalent or equivalents therefor. Second. The auxiliary scale on the short arm of the steel yard. Third. The moveable bar A, or its equivalent. Fourth. The balancing lever

and stirrup of the scale pan. The whole being made to operate together by means of weights, substantially in manner and for the purpose as specified.

TILLY FLINT.
WARREN FLINT.

No. 6195.—*Improvement in Planing Machines.*

Having thus fully described the parts used in these combinations, and shown the modes contemplated for using them, what I claim as my invention and which I desire to secure by letters patent, is the application to the face disk C, of one or more long or broad plane irons or finishers, embracing the whole width of the board, the inner ends or edges of which, being slightly elevated, and which in their rotations form or generate a slight cone *a*8, in combination with the jacking tools *a*7, or of gauges placed upon the periphery for the purpose of producing a two-fold action, that is, the slight conical cut of the finishers *a*8, and the perfect disk operation of the jacking tools *a*7; thus uniting and claiming the action of the cone and the disk in one and the same planing wheel; I thus produce the effect of the Bramah gauges, in chipping or hewing away the roughest part, the jacking tools revolving in the perfect plane of the disk, and also the effect of the cone by the slight elevation of the finishers *a*8, on the end near the shaft 6, which effect is to finish the surface while the finishers *a*8, are cutting with the grain of the wood, the shaft 6, being slightly inclined to correspond with the elevation of the knives or finishers *a*8; the finishing is thus done with the grain, and leaving no circular mark across the board, and in contradistinction to the finishing operation, as was performed by Bramah, his finishers cutting in circular scores across, from one edge to the other of the board, leaving the surface indented with them, and unfit for use, while I produce a perfectly level and smooth surface, substantially as described and shown.

THOS. J. WELLS.

No. 6196.—*Machine for making Percussion Caps.*

I do not claim as my invention, punches and dies for making percussion caps, as these have been so employed in various ways; but what I do claim as my invention, and desire to secure by letters patent, is the combination and arrangement of the mechanism above described, for producing the combined operations herein fully set forth, of feeding the metallic ribbon to the star die U′, punching the blank from the ribbon, transferring the blank to the forming die V, by the transferring apparatus T T′ T″ T‴, punching the blank into the forming die V, and forming it into a cap, and discharging the same from the die by the elevator *e*, and kicking the cap, in a finished state, from the die bed, by the driver *y*; all of said operations being performed successively at every revolution of the crank and cam arbor C, to which the propelling power is applied, substantially as above described.

Secondly. I also claim the transferring apparatus, constructed substantially as described in combination with the punches.

R. M. BOUTON.

No. 6197.—*Improvements in Carding Machines.*

First. Having thus explained the nature of my invention, its mode of construction and operation, I do not claim the lap cylinder (*k*,) nor the licker-in

$(a,)$ nor the feed rollers $(n\ n,)$ but I claim the weighted roller $(m,)$ in combination with the feed rollers and the lap cylinder, for the purpose of drawing in cotton, and feeding it to the licker-in in a thinner sheet than is done by carding machines at present in use.

Second. I do not claim a licker-in, nor the first main cylinder as such, nor the common action of such cylinders as they may have been heretofore well known, in whatever relative position they may have been placed; but I do claim the aperture and chamber in the casing at $(t,)$ where the casing projects in near to where the main cylinder card at its lowest surface takes the staple from the top or upper surface of the licker-in card, near to such aperture and chamber as described (and also provided in the casing;) and I do claim them also in combination with the peculiar placing of such main cylinder $(b,)$ directly over the licker-in $(a,)$ so as to bring their place of nearest proximity and action exactly or nearly over the centre of the licker-in, and as near to such aperture and chamber as it may safely be placed, in order to discharge such dirt and silicious impurities as may be disengaged by such action, and throwing it through such aperture by the combined motion of both cylinders, without allowing it to fall either into the cards again, or on to the lap or mat of cotton entering them.

Third. I do not claim the using of two doffers to one main cylinder, or of double doffers, so called, as such have been used in different methods, and for different purposes, having action with the main cylinder; but I do claim the arrrangement and action of a reducing doffer, as my own invention, the same having no action with the main cylinder, but with the doffer, whereby I collect the fibre from the common doffer, though sparsely scattered thereon, into a thicker sheet or mat more suitable for a proper delivery by the comb or other apparatus for stripping or clearing the same; and I claim the same, whether operated by using two such reducing doffers in combination as cylinders $(g,)$ and $(h,)$ fig. 1st, or by using one only, as cylinder $(q,)$ in fig. 2, or in any other way that is substantially the same in principle and effect, in order to collect the staple from the common doffer into a thicker mat, to be taken off by a comb or other stripper. I am enabled by the action of such reducing doffer to run the common doffer at a much greater speed than is usual, thereby presenting a much larger amount of clean doffer and sheet to the surface of the main cylinder, whereby I keep the staple in greater sparsity than I otherwise could, without having it too sparse to be delivered in a perfect mat or sheet.

Fourth. I do not claim a card roller or top clearing cylinder, extending across a main cylinder, simply as such, I having understood that top flats have been constructed as well rotating as stationary; those revolving, doing so in a direction calculated to press the impurities by them disengaged from the main cylinder, under their lower surfaces, between them and the main cylinder, carrying it to a place to be stripped from off their rising surface; but what I do claim, is a card roller or top clearing cylinder $(i,)$ moving the impurities, disengaged by its lower surface from the main cylinder on its edge in a direction contrary to the edge and action of the main cylinder, and calculated to take it out from the place of contact without pressing it between itself and the main cylinder, in combination with beater or stripper (J,) revolving in a manner to clear the same, and deposite the strippings as described.

THOMAS G. BOONE.

No. 6198.—*Improvement in Cooking Ranges.*

What I claim is the combination of the auxiliary heating chamber T, and secondary fire place and flue S′, with the main fire place specified; the said secondary fire place being made to receive its air from its side, and through the main fire place

JOHN M. DEARBORN.

No. 6199.—*Improvement in Draining and Blanching Sugars*

What I claim as my invention and desire to secure by letters patent, is the method of bleaching and draining brown sugars on the plantation, ashere in set forth; that is to say, blanching the sugar by a solution of molasses and water, both being in the cold state, and the operation being performed in the hogshead destined for the transportation of the sugar to market, thereby increasing the value of the sugar without a corresponding increase of expense, as herein set forth and described.

J. SPANGENBERG.

No. 6200.—*Improvement in Processes for Burnishing Metals.*

What I claim as my invention and desire to secure by letters patent, is the mode herein described, of preparing surfaces of cast or wrought iron, or other metals and stone, so that they may be gilded or silvered in the same manner as wood and burnished with equal facility, viz: by applying thereto the preparations of shellac and yellow ochre, (or other similar and suitable earthy or mineral substance,) herein set forth and described.

EDWARD SATTERLEE.

No. 6201.—*Improvement in Portable Hot Air Furnaces.*

Having thus described my improved portable furnace, I shall state my claim as follows:

What I claim as my invention and desire to have secured to me by letters patent, is the combination of four or more horizontal and parellel smoke flues or chambers, each connected with the one next above it *alternately* at the *front* and then at the rear of the furnace, and the top plate of each chamber having for the purpose an opening to establish the connection, as described above, with the two exterior diving cold air flues $q\,q$—$q\,q$, and the central hot air chamber $r\,r$, the whole being substantially as herein above set forth.

JOHN P. HAYES.

No. 6202.—*Bell Telegraph.*

What I claim as my invention and desire to secure by letters patent, is the combination of the turning tablets, with the wires, springs, and levers for turning them, arranged substantially in the manner and for the purpose herein described.

HARVEY HOUGHTON.

No. 6203.—*Improvement in Magnetic Telegraphs.*

Having thus described the construction and action of my machine, what I claim as my invention and desire to secure by letters patent, is moving the paper on which telegraphic marks are made, into and out of contact with a stationary pen, by which means I avoid the danger of dispersing the ink, which happens when the pen is rapidly agitated, and also gain the advantage of supplying the ink while the telegraph is in action, to a pen wholly at rest, as herein set forth.

I also claim the operating the magnet which effects the movement of the paper directly through the main telegraphic circuit, thereby dispensing with the secondary or receiving magnet and local battery.

I also claim the arrangement herein described for conveying ink to the stationary pen of a marking magnetic telegraph, by means of an adjustable feeder regulated to correspond in its action with the rate of motion given to the strip of paper on which the telegraphic marks are to be made, in a manner substantially as herein set forth.

I also claim the horizontal adjustable supporting stand A, in combination with the stationary pen axis *a*, the paper carrier *o*, and its adjusting screw H, and with the vibrating lever B, when employed to adjust the direction of motion of the paper and allow the marks to be made along its central line, in the manner and for the purposes herein set forth; not intending in these claims to limit myself to the precise arrangements of parts herein described, but to vary the same at pleasure, while I attain the same ends by means substantially the same. CALEB WINEGAR.

No. 6204.—*Improvement in Cotton Cultivators.*

What I claim as my invention and desire to secure by letters patent, is—

First. The grooved board fig. 4, fitted to the scraper and bolted to the beam for the purpose of protecting the plants from falling clods of earth; and

Second. The arrangement of teeth in one beam B, of the cultivator, and constructing them of different lengths for the purposes set forth.

SAMUEL W. AKIN.

No. 6205.—*Improvement in Air Heating Furnaces.*

What I claim is the manner in which I arrange the furnace, smoke pipe, and air heating spaces, as herein set forth, that is to say, I claim placing the furnace at or near the centre of the spiral flues and air spaces, the furnace being surrounded on all sides except the back and front, as herein described.

I also claim the manner of arranging the valve K, in combination with the three flues I, *i*, and L, for the purposes of heating and ventilation, as herein set forth. OLIVER TIFFANY

No. 6206.—*Self-adjusting Railroad Switch.*

I am aware that the switch has been changed by the action of the cars, and the apparatus connected with them in various ways; I therefore do not claim changing the switch by apparatus worked by the cars, as such, as my invention; but what I do claim as my invention and desire to secure by letters patent, is the combination of the triangle H, with the wheel G, the detent *j*, the lever O, and the bars *l* and *o*, when connected by the bars *d* and *d'*, and the triangle H, connected with the bars D and E, by the bar K, and the wheel G, connected with the switch B B, by the bar F, or other analogous device, (and the corresponding parts marked D' E, &c., when the train is passing in the opposite direction.) The whole constructed, arranged, combined, and operating substantially as herein described.

ERASTUS C. MATTHEWSON.

No. 6207.—*Improved Spring Snap Hook.*

Having thus described the construction and operation of my improved barbs and spring snap hook, I do not claim to have invented the hook, shown in figures 1 and 2, as that is well known, but what I do claim as new and of my own invention and desire to secure by letters patent of the United States, is as follows:

I claim the sliding springs 3 and 4, figures 3, 4, 5 and 6, with points turning outwards, with or without barbs, in combination with the single spring 12, and hook 13, shewn in figures 7, 8, 9 and 10, or the double spring 18, 18, with hooks 19, 19, in figures 11, 12, 13 and 14, or with the barbed lance shewn in figures 17, 18, 19 and 20.

JOB JOHNSON.

No. 6208.—*Improvement in the manufacture of Paper Veneers.*

What we claim as our invention and desire to secure by letters patent, is the application and use of the type and ink, as herein described, for the purpose of manufacturing paper veneer, and making an application of it to the purposes herein designated.

CHARLES WALKER.
GEORGE WILLSON.

No. 6209.—*Adjustable Cut-off.*

Having thus described my method of operating the valves of steam engines, what I claim therein as of my invention and discovery and for which I solicit letters patent, is raising the valves by means of the tappets of a revolving shaft, acting against the adjustable sliding feet of horizontal vibrating levers which raise the valves, whereby the steam can be cut off at any point in the stroke of the piston that may be desired, and the points of cutting it off changed from time to time without stopping the engine. I desire it to be understood, that I do not limit myself to the precise arrangement of parts herein represented, but claim the right of varying the same to any extent that may be deemed advisable, while I accomplish the same results by essentially analogous means.

I likewise claim reversing the motion of the engine by means of the clutch coupling, arranged and operated substantially as herein set forth; and also by the same means throwing the chain which operates the valves out of gear, when it is required to work them by hand.

JULIUS KING.

No. 6210.—*Improved Sliding Wrench.*

Having thus described my improvements, I shall state my claims as follows:

What I claim as my invention, is a wrench in which the sliding jaw is moved by two segments of a cylinder connected with said jaw, as above set forth, and having screws on their upper ends engaging with the screw on the interior of the hollow cylindrical handle, the arrangement of the several parts being substantially as herein above set forth.

DEXTER H. CHAMBERLAIN.

No. 6211.—*Improvement in Planing Machines.*

Having thus fully described my improved planing machine, I wish it to be understood, that I do not claim merely the two revolving feeding platforms, they having before been used, but what I claim therein as new and for which I desire to secure letters patent, is—

First. The combination of endless platforms or bands, as described, above and below the plank, and geared together so as to be forced to move in one direction and with the same velocity, said top platform being held down upon the board, by means of the links n, with a force varying with the resistance of the cutters, for the purpose of forcing the plank through under the stationary cutters, as above described, when used in combination with said stationary cutters.

Secondly. I claim the stationary cutters, in combination with the yielding bar mouth pieces, substantially in the manner and for the purpose set forth.

Thirdly. I claim the adjustable edge rollers, in combination with the tongueing and grooving cutters, or other stationary edging cutters, as above made known.

JOSEPH P. WOODBURY.

No. 6212.—*Improvement in Gas Burners.*

What I claim as my invention and desire to secure by letters patent, is, in the first place, the application to gas burners of a ring, band or tube of any kind, moveable or stationary, or made with the said burner out of the same piece, for the purpose of increasing the light by altering the shape, direction or force of the stream of gas escaping from a gas burner of any construction whatever.

I also claim, in the second place, and desire to secure in the same manner, the application of notches to the upper edge of the tube, for the purpose of giving shape or brilliancy to the flame, resulting from the combustion of gas from burners, to which a tube band or other similar body has been applied.

I also claim, in the third place, and desire to secure as aforesaid, the mode of regulating the flame of gas burners, having a band, tube, ring, or similar body, namely, by raising and lowering said tube, band, ring, or other similar body, by means of a nut and screw, (or slide,) or by any other known means of changing the relative position of the edge of the tube, and the nipple of any kind of gas burner, to which my invention may be applied.

DANIEL H. SOLLIDAY.

No. 6213.—*Improvement in hanging Carriage Bodies.*

What I claim as my invention and desire to secure by letters patent, is the above described arrangement of a cross or disk, attached by a pivot to the perch of a spring vehicle, combined with the inflexible rods or braces, attached to the body of the carriage, and so disposed on the extremities of the cross or periphery of the disk that the oblique action which they produce on one side shall counteract that which they produce on the other, in the manner and for the purposes herein set forth; and I claim the application of this, my invention, as well to railroad cars and trucks as to vehicles running on common roads.

ISRAEL JACKSON.

No. 6214.—*Improvement in Surgical apparatus for fractured or injured ankles.*

What I claim as my invention, and desire to secure by letters patent, is the mode of supporting the ankle when fractured or otherwise injured, at the same time allowing a flexible movement to the same, by means of the before described combination of spring bars E G, and moveable stops F f, shank plate A, curved, jointed and oval bars, and pad or bandage, as described.

GEORGE W. YERGER.

No. 6215.—*Improvement in Springs for Carriages, &c.*

What I claim as my invention and desire to secure by letters patent, is the before described mode of making India rubber springs for carriages and other purposes, by which the several endless elastic belts are successively brought into action as the load is increased, by means of the combination of the concentric endless elastic belts, and concentric rows of pins, or their equivalents, the concentric segment rings being connected to the plates attached to the body and running gear of carriages, the several parts being constructed and arranged, substantially as above described.

DANIEL R. PRATT.

No. 6216.—*Improved machine for turning a Lock on sheet metal.*

I do not claim the bed piece, the tumbler, the folding slide or the lever, separately; but what I do claim as my invention, and desire to secure by letters patent, is the combination of the bed piece, the tumbler, the folding slide and lever, for the purpose of turning a lock on sheet iron or other metals, as herein described and set forth by these specifications.

JOHN WRIGHT.

No. 6217.—*Improved conical valve Tuyeres.*

Having thus fully described my improved forge tuyere, what I claim therein as new, and desire to secure by letters patent, is the giving the moveable valve c, the form of a cone, for the purpose of facilitating the discharge of the ashes and cinders into the air box and ash pit, and for protecting the valve from being injured by the fire, substantially as herein set forth.

ROBT. D. PORTER.

No. 6218.—*Improved Feeder and Nippers for Screw Cutting Machinery.*

What I claim as my invention and improvement, and desire to secure by letters patent, is first, the permanent vertical feeding tube or shaft, extending from the top of the frame down to a point near the grippers, in combination with the revolving tube (c,) and grippers (d,) whereby I am enabled to feed the blanks directly through the said tube on the grippers, without imparting rotary motion to them until they reach the jaws of the grippers, thereby ensuring perfect regularity in the feed, as described; secondly, I claim the peculiar construction of the grippers in respect to the double action of the jaws, whereby but one screw blank can enter, be held and discharged at a time, although a series of the said blanks may fill the entire length of the stationary feeding tube, the whole operating substantially as set forth herein.

WILLIAM VAN ANDEN.

No. 6219.—*Clarification of Cane Juices.*

What I claim as my invention and discovery, and desire to secure by letters patent is,—

First. The direct application of steam by injection to the sugar cane juice whilst in the vats, and before being transferred to the "*grand*" for the purpose of speedily heating, clarifying, defecating, purifying and freeing the juice of the feculent and other extraneous, injurious and impure matter, as herein fully set forth

J. SPANGENBERG.

No. 6221. — *Combined convex and concave Auger.*

What I claim as my invention, and desire to secure by letters patent, is forming the lower part of the plate from which an auger is to be formed, of a convex shape or of even thickness, when this is combined with the upper part of the plate formed of a concave shape, the whole plate being formed for the purpose of making therefrom a double tipped convex and concave auger.

NATHANIEL C. SANFORD.

No. 6222. — *Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the oblique plate under the forward part of the bottom of the oven, when this is combined with the air chamber formed by the oblique plate and the forward part of the bottom oven plate of a cooking stove, as herein described.

WILLIAM E. BLEECKER.

No. 6223. — *Improvement in Piano Fortes.*

I do not limit myself to the peculiar mechanical detail herein set forth and described, for supporting, raising and depressing the weights, intending to use any of the well known mechanical apparatus fitted for that purpose.

I claim the application of weight or pressure upon the sounding board of the piano forte, either directly or upon the crooked bridge thereof, as the most convenient mode of applying the same for the purpose of producing a change in the tone of the instrument, thereby extending its musical capabilities.

JAMES A. GRAY.

No. 6224.—*Combination of adjustable Saddle and Winch.*

What I claim, therefore, as my invention and wish to secure by letters patent, is the combination of a winch with a moveable and adjustable saddle, connected so that the winch moves with the saddle, the whole being constructed, arranged and operating substantially as herein described.

A. G. POLHAMEUS.

No. 6225.—*Improvement in Self-acting Cheese Presses.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of two levers with their corresponding pairs of pulleys, having cords passing around them to their respective barrels, as substantially herein described.

BENJAMIN H. OTIS.

No. 6226.—*Improvements in adjusting the position of Plane Irons and regulating the Throats of Planes.*

What I claim as my invention and desire to secure by letters patent, is the regulation of the mouth in planes, so as to enlarge or diminish the same, and for the preservation of a close mouth in planes, as herein described, by a wedge or key (B,) being placed under the bit and fastened by a screw.

E. W. CARPENTER.

No. 6227.—*Improved Sash Stopper.*

I do not claim the case or the bolt separately, but what I do claim as my invention and desire to secure by letters patent, is the combination of the case and bolt, as herein described, for the purpose of holding the sash up or down.

WM. E. ARNOLD.

No. 6228.—*Improvement in Corn Shellers.*

The parts which I claim as my own invention, are the combination of the shute E, cylinder C, and shute J, for feeding and shelling the corn and discharging the cobs, as described.

JOHNSTON SMALL.

No. 6229.—*Improvement in Guides for Warpers.*

What I claim as my invention and am desirous of securing by letters patent, is the application of the principle of contraction and expansion to the "warper guide," and for the purpose of accomplishing this I will make use of a metallic coil of wire.

WHITING HAYDEN.

No. 6230.—*Elliptical or Oval Truss Frame for Bridges.*

What I claim as my invention and desire to secure by letters patent, is the union of the ordinary chords of a truss frame into *one continuous elliptical or oval curve*, in which the thrusts and tensions of the truss so constructed will operate in the manner set forth herein.

JAMES BARNES.

No. 6231. — *Improvement in Caoutchouc Springs.*

What I claim as my invention and desire to secure by letters patent, is the combination of helical springs made of metal, with, and placed within hollow springs made of metallic or vulcanized India rubber or any equivalent preparation of rubber, substantially as described, whereby the rubber is prevented from spreading laterally, and from chafing against the guide rod, and the tension of the rubber is increased by that of the helical spring, as described.

F. M. RAY.

No. 6232.—*Improvement in Thrashing and Grain Separating Machines.*

Having thus fully described my improved apparatus for cleaning grain,

what I claim therein as new and for which I desire to secure letters patent, is—

First. The straw carrier, constructed and arranged as above described, consisting of three or more revolving rakes so arranged as to cause the straw to turn over in its passage out of the machine, substantially in the manner and for the purpose set forth.

Secondly. I claim in combination therewith the apron (h,) as above made known. I also claim the elastic teeth (m',) placed opposite the revolving rakes for lightening the straw, combined with the teeth of said revolving rakes, and arranged as above specified. I also claim in combination with the above named straw carrier $f\,g\,i$, the revolving apron (o,) for conveying the grain to the screen, as set forth.

Lastly. I claim the moveable lower side rails (a',) and roller (x,) attached thereto, for the convenience of moving the machine, as herein before described.

ISRAEL J. RICHARDSON.

No. 6233.—*Improvement in Splint-Broom Machines.*

Having thus pointed out the nature of our invention, the best mode of constructing and using the same, and the various modes in which the principle or character of our invention can be applied, we declare that what we claim as our invention and desire to secure by letters patent, is—

First. Cutting a series of splints on, or from the surface of a block of wood, with a cutter, by a series of cuts in the direction (or nearly so) of the grain of the wood, substantially as described, in combination with a series of intermittent motions, that the splints may be cut in succession one after another along the entire surface of the block, substantially as described.

Secondly. Combining with the cutter that forms the splints on the block, one or more slitting cutters placed at the required distance from the main cutter, substantially as described, that each splint may be divided into two or more parts towards the point, as described.

Thirdly. The method of forming the splints thicker at the butt than at the point, substantially as described, by moving the block of wood towards the cutter, or the block and cutter towards each other, substantially as described.

And finally, the method of making the splints on the block shorter as they approach the centre of the block, by changing the position of the block or the cutter, or the range of motion of the cutter, substantially as described.

JOHN CRUM.
ABRAHAM LARWILL.

No. 6234.—*Improvement in Artificial Manures.*

Having thus fully shown and specifically described the nature of our discovery or invention, and given a full and exact description of the manner of making and using the same; now what we claim and desire to secure by letters patent, is the *residuum* from the manufactory of alum, and the residuum from the manufacture of epsom salts, in composition with any or all of the herein before described materials, for the purpose of making the mixture, or a modification thereof, as herein before described, which said composition or mixture is to be made in the way or manner, and to be used as herein before fully set forth.

PHILIP S. CHAPPELL.
WM. HENRY CHAPPELL.

No. 6235.—*Improvement in Grain Separators.*

Having explained the nature of my invention, its mode of construction and operation, I do not claim the endless web or elevator b, in itself as a new invention, but I claim the projections or pins c, on the said elevator, in combination with the rack or slat frame d.

I also claim the combination of the crank with the toothed roller k, to give the latter a traverse or side to side motion, all for the purpose herein described.

DANIEL WOODBURY.

No. 6236.—*Improvement in Printing Presses.*

Having thus fully described the manner in which I combine and arrange the respective parts of my cylinder printing press, and shewn the operation thereof, what I claim therein as new and desire to secure by letters patent, is—

First. The manner in which I combine the two cylinders in my printing press with their respective platforms, one immediately above the other, under an arrangement such as is herein described, by which each of the cylinders is made to take impressions from the forms on the platform to which it appertains, the lower cylinder perfecting the sheet which has been printed on one side by the upper cylinder and forms.

I claim the manner of advancing the forms, and of carrying them under the cylinder by the gearing of the toothed wheels, on the ends of said cylinders, into teeth rising up from the edges of the chase or frame in which the form is locked up.

I claim the manner set forth of constructing the sliding carriages, and of combining them with the platforms and with the forms sustained thereon, by which construction and combination the form from which an impression has been taken is made to descend and pass back under the form last elevated, and is itself again elevated and forced forward; the respective parts of this apparatus being substantially the same in construction and operation with that herein described and represented.

JASON L. BURDICK.

No. 6237.—*Improved machinery for Drilling Rocks.*

I claim as my invention, the combination of the bars a, b, or any equivalent therefor, the frame G, and its journals and slide boxes, as constructed, adapted to one another, and made to operate together, substantially in the manner and for the purpose of supporting the drill and directing it into any desirable position, substantially as specified.

I also claim a combination made up of the following elements, viz:

First. Mechanism for throwing or moving the drill forwards, and drawing it backwards, when it is placed in such a position that it would not be advanced by the action of gravity alone, as it has heretofore been made to operate, the said mechanism being the crank shaft, cranks and connecting rods, directly connected with the slide frame W, and the supporting and

directing frame G, or any well known equivalent machinery applied to produce similar movements of the drill.

Second. The gripping apparatus, or that by which the drill rod is seized or clamped to the drill frame at the proper times, the same consisting of the bearings or jaws *t*, *u*, the wedge *v*, lever *w*, and spring *d'*, and its cross bar *e'*, directly over said jaws.

Third. The apparatus which causes the jaws to relax their hold of the drill and set it free or independent of the drill frame W, and so that it may be impelled forward by its momentum, and suffered to recoil without injury to the rest of the machinery, the same consisting of the cam block *z*, and its inclined spring *a'*, constructed and applied as described; it being expressly understood, that I lay no claim to any combination of machinery so arranged as merely to lift or draw back a drill, and so that it may act or fall against the substance to be drilled by the power of gravity alone, the invention or improvement claimed by me being a combination of such mechanism, and a mechanism for throwing or impelling the drill, independently of the power of gravity, in order that the drill may be placed and operated in any inclined position, as well as in a vertical position.

JOSEPH J. COUCH.

No. 6238.—*Improvement in Air-heating Furnaces.*

What I claim therefore as my invention, is the arrangement of the air-heating flues or spaces, in combination with the descending and ascending draft, as herein above described, so that the air to be heated shall enter and come in contact first with the coolest portion of the flue, and issue from the warmest into the air chamber.

HORACE BUSHNELL.

No. 6239.—*Improved Canal Steamboat.*

Having thus described the construction and operation of my improved steamboat for canal navigation, I desire it to be understood, that I do not claim to be the inventor of any of the parts of the same in themselves; but what I do claim, is the combination of the paddle wheel, having inclined buckets, with the wave queller arranged as herein described, or any other substantially similar manner, whereby the boat is propelled with comparatively little disturbance of the water or abrasure of the banks of the canal from the action of the wheel.

GRENVILLE PARKER.

No. 6240.—*Improvement in Spring Lancets.*

What I claim as my invention and desire to secure by letters patent, is causing the point of the lancet to sweep in an eccentric curve, simultaneously with its longitudinal movement in the case, by the combined action of the fixed stud *o*, in the carriage and the oblong aperture *i*, in the lancet, by which it is made to cut the vein with an oblique draw knife stroke, avoiding the tendency to rebound in cutting a tough vein or elastic skin, when thrown forward in a straight line at right angles to the vein, the *length* of the incision being increased or diminished by changing the position of the stud *o*, and its *depth* by turning the graduating screw G, of the carriage, as aforesaid.

JOSEPH IVES.

No. 6241.—*Improvement in shading Pictures by Metallic Leaves.*

What I claim as my discovery and desire to secure by letters patent, is the shading of gilded pictures by metallic leaves, and by the process herein described.

EMANUAL HARMON.

No. 6242.—*Improvement in Dyeing.*

What I claim as my discovery, and desire to secure by letters patent, is the peculiar compound of nitrate of potash, or nitrate of soda, and muriate of soda with the sulphuric acid and coloring matter, in manner and for the purpose herein described, by which I make a superior and much cheaper dye than has before been made to produce such colors in fabrics, when dyed in manner and for the purposes herein described and set forth.

SAMUEL MALLERD.

No. 6243.—*Improvement in Type casting Machines.*

Having now described my invention, and the operation of the same, I will proceed to state what I claim as my invention; Is the conical plug L, and arrangement of the clamber in which it works, in combination with the nipple and bath, and well of a type casting machine, substantially in the manner and for the purposes herein set forth; and also in combination with the conical plug L, I claim the arrangement of the levers O and S, and cam T, substantially in the manner and for the purposes herein set forth.

JOHN J. STURGIS.

No. 6244.—*Improvement in Self-lighting Lamps.*

What I claim as my invention, and desire to secure by letters patent of the United States, is the combination of a shaft actuated by springs which may be relieved from confinement, and turn the shaft with the disks and match, so as to bring it in contact with the igniting table, and present the blaze of the ignited match to the lamp, and light the same in manner herein described, by means of an alarm of any kind.

ALEXANDER BENNETT.

No. 6245.—*Improvement in Harvesting Machines.*

Having thus described the construction and operation of my improved harvester, what I claim therein as new, and desire to secure by letters patent, is suspending the frame which carries the conveyor, reel and cutter upon the axles of the wheels A A', when the frame thus suspended is hinged to the tongue and rendered capable of being turned upon its bearings by means of a lever for the purpose of elevating and depressing the cutter, as herein set forth.

JONATHAN HAINES.

No. 6246.—*Improvement in Spectacle Frames.*

What I claim therein as new, and desire to secure by letters patent, is combining either one pair, or any desired number of pairs of glasses or lenses in one frame, in manner and for the purposes substantially as herein set forth and described, so that if a glass or lens be moved, its mate or the other member of the pair will, by means of the interlocking of the teeth of the small wheels, sectors, or gearing, or its equivalent, have an equal or simultaneous motion, and each member of each pair will at all times be in a position corresponding with its mate, and this I claim, irrespective of the manner of uniting the bands

which surround the lenses with the connecting arms, or the means of combining the clutch bar with the clutch arms; not intending by this claim to limit myself to any particular form, number of parts or material, but to vary them as I may deem expedient, while I attain the same ends by means substantially the same.

I also claim that part of the apparatus which I have named the clutch arm, composed of a slider socket and slider, constructed and combined with each other in manner and for the purposes, substantially as herein set forth and described, whether such clutch arms are used in combination with the other parts of the spectacle herein described, or with parts of spectacles of any other description, and this I claim, irrespective of the eye formed on the end of the clutch arm, or the manner or means by which they may be combined with spectacles; not intending to limit myself by this claim, to any particular form herein named, or material, but to vary them as I may deem expedient, while I attain the same ends, by means substantially the same.

JACOB SHAW, Jr.

No. 6247. — *Improvement in Locomotive Baby Tenders.*

I claim and desire to secure as my invention, all the three upright posts or moveable arms, moving in or out, and operated by an increased power spring for the purpose intended and described. J. CUTTS SMITH.

No. 6248. — *Improvements in Reaction Water Wheels.*

What I claim as my invention and desire to secure by letters patent, is causing water to flow at pleasure in different directions from the centrifugal water wheel or engine, thereby reversing the direction of its revolutions.

JESPER SMITH.

No. 6249. — *Improvement in Planing Machines.*

Having thus fully described our invention, and the mode of operation, what we claim therein as new, and for which we desire to secure letters patent, is first, the combination of the disked cutter wheel (*e*,) and stationary bitt in the frame (*g*,) substantially in the manner and for the purpose set forth, the whole being constructed and arranged as above specified.

C. A. SPRING.
W. H. DERRICK.

No. 6250. — *Improvements in Deep Sea Diving Bells.*

Now we do not claim as our invention, the closed bell of itself, as a closed bell or vessel has already been used for submarine purposes; neither do we claim the attachment of two pipes, both leading from the bell to the surface, one for the ascending, and the other for the descending current of air, as that has heretofore been done; but what we do claim as our invention, and desire to secure by letters patent, is the combination of working rods with the diving bell, by means of ball and socket joints, or their equivalents, substantially as herein set forth. J. AVERY RICHARDS.
J. W. WOLCOTT.

No. 6251. — *Improvements in Rotary Engines.*

Having thus fully described my improvement, what I claim therein as new, and for which I desire to secure letters patent, is the recess F, within the circle of the steam channel, in which is placed an expansion plate, on which the heat can act in the manner and for the purpose herein set forth, and having the friction of the revolving wheel confined to that part of the stationary case which can be made to expand and contract with said wheel, all as above specified. JOHN CHAPLIN HOWARD.

No. 6252.—*Improvements in Bank Locks.*

Having thus fully described the nature of my improvements in the locks herein referred to, what I claim therein as new and desire to secure by letters patent, is the manner herein set forth of combining the slide C C, with the combined cams or escapement A A, and with the dog E, and the pin F, for the purposes set forth. I also claim the manner of combining the additional tumbler J J, with the revolving scutcheon under an arrangement, and for the purpose herein fully made known.

HENRY RITCHIE.

No. 6253.—*Improvements in Machinery for Turning Lasts, &c.*

What we claim as our invention and desire to secure by letters patent, is—

First. The method of finishing the heel and toe of the last by holding the pattern and last in cylindrical holders, and removing the centres and applying the cutters simultaneously to the toe and heel, substantially as above described. We, however, do not claim the revolving cylindrical holders, nor the mode of turning them, as described.

Second. We likewise claim the mode of varying the form or fashion of the last whilst turning, as described, by means of the adjustive pawls and pawl-wheel combined, with the machinery for operating the reverse patterns, as herein set forth. ELBRIDGE WEBBER.
CHARLES HARTSHORN.

No. 6254.—*Improvements in Machinery for making Iron Wheel Tires.*

What we claim as our invention and desire to secure by letters patent, is the combination of the drawing out and forming rollers mounted on the vertical shafts, so geared and arranged that one can be moved towards and from the other, when this is combined with the bed plate for guiding and keeping the edge of the tire true, substantially as described.

We also claim, in combination with the drawing out and forming rollers, the employment of the auxiliary roller for determining the circle of the tire to be formed, substantially as described, when the said auxiliary roller is so connected with slide of the moveable forming roller, that the auxiliary roller may be adapted to the increasing diameter of the tire as it is being drawn out, as described. THOMAS W. ALLEN.
CHAS. W. NOYES.

No. 6255.—*Employment of an auxiliary Engine in combination with the Condenser Pump.*

What I claim as my invention and desire to secure by letters patent, is the combination of the condenser of a steam engine for the propelling of a ship or other vessel, with a pump, that receives the condensing water from outside of the vessel and causes it to pass the condenser when the said pump is operated by an auxiliary engine, substantially as herein described.

And I also claim the double connection of the condenser, that is with the exhaust of the propelling engine and with the boiler, substantially as described, when the said condenser is combined with a pump that receives the condensing water from outside of the vessel, and is impelled by an auxiliary engine, substantially as described. J. ERICSSON.

No. 6256.—*Improved Auger Stock.*

What I claim as my invention and desire to secure by letters patent, is—

First. The combination of the revolving adjustable handles with the stock, the same being arranged and operated substantially in the manner and for the purpose herein described.

Second. The combination of the turning collar on the shank of the auger with the stock, substantially as herein described, the collar to be grasped in the hand to guide the auger when beginning to bore a hole while being turned by the handle, adjusted so as to operate in the manner of a winch, whereby the auger is more steadily held and more readily entered into the wood, as herein set forth.

WILLIAM T. BARNES.

No. 6257.—*Improvements in Raising and Conveying Water.*

Having thus described our invention, we claim the combination of the spring cams K K, with the cap pieces of the carrier, the slide Q, and the bucket top for holding and releasing the carrier, as set forth.

We also claim the spring fork R, in combination with the bucket ring P, and the upright rod or arm D, to hold and release the bucket, and to catch again into the ring of the bucket at proper times, substantially as herein described and for the purpose set forth.

JOHN J. COX.
SAM'L P. COX.

No. 6258.—*Improvement in Saws.*

What I claim as my invention and desire to secure by letters patent, is the moveable and loose teeth (B & C,) in any kind of saw, regardless of shape or form, or manner of insertion, for I am aware that they can be made in other shapes aud placed in blades made different that would answer as well.

EBENEZER CLARK.

No. 6259.—*Improvements in Machinery for Picking Wool, &c.*

What we claim as our invention and desire to secure by letters patent, is the forming of the concave of a series of rolling bars geared together at the ends, in the manner and for the purpose specified, in combination with the picker cylinder, as described, and finally, we claim in combination with the picker cylinder, the slow turning rollers placed above the delivery, substantially in the manner and for the purpose specified.

REUBEN DANIELS.
ALBERT G. DEWEY

No. 6260.—*Improvement in Boot Crimps.*

Having thus fully described our invention, what we claim therein as new, and for which we desire to secure letters patent, is the combination and arrangement of the moveable parts *e c* and *a*, of the clamp, with the stationary part *x*, in the manner set forth.

SARDIUS PASCO.
ELIHU PERRY.

No. 6261.—*Improved Awl Haft.*

Having thus described my improvements, I shall state my claim as follows: What I claim as my invention and desire to have secured to me by letters patent, is a tool handle or awl haft, having split shaft for the holding the tool, which is *forced outwards* by a screw shaft, attached to the under side of the cap, and abutting against the top of said split shaft, as herein above set forth; said screw shaft being worked substantially as herein above specified.

D. H. CHAMBERLAIN.

No. 6262.—*Machine for paying seams of Vessels.*

What I claim as my invention, and for which I desire to secure letters patent, is the revolving paying wheel, in combination with the supply box, or with the supply box and feeding wheel, the whole constructed and operating substantially in the manner and for the purposes herein described.

SAMUEL BAKER.

No. 6263. — *Improvement in Lubricating Compounds.*

Having thus particularly described our invention, what we claim therein as new, and desire to secure by letters patent is—

First. The combining of *potash (or other alkaline substance)* with *water* and *oil*, *lard*, or *resin*, (or other oily, fatty, or resinous substance,) by the process substantially as herein described, into *a neutral or nearly neutral compound as a base*, for a lubricating mixture, substantially as above described.

JOHN CUMBERLAND.
WM. W. CUMBERLAND.

No. 6264. — *Improvement in Cooking Ranges.*

Having thus described my cooking range, I proceed to state what I claim as my improvement, and for which I desire letters patent:

First. I claim the syphon shape of the air chamber for the purpose of moderating the heat acting on the side of the oven nearest the fire chamber, substantially as above set forth.

Secondly. I claim the special arrangement and combination made by me, of the ovens, fire chamber, draft, ash pit and syphon chamber, as herein set forth.

F. S. MERRITT.

No. 6265. — *Machine for Spherifying Bullets or Pills.*

What I claim as my invention and desire to secure by letters patent, is the oblique gyration of one hemisphere within another, for the purpose of spherifying any mass of matter, in the manner above described.

I also claim the sloat F, or any outlet for the purpose of letting out the bullets.

JONATHAN F. OSTRANDER.

No. 6266. —*Adjustable Dam or Water Wier.*

What I claim as my invention and desire to secure by letters patent, is the combination of the two inclined leaves or float gates with each other, and the

paddle gates, the whole arranged as described, between abutments, and forming an adjustable dam and waste wier.

MILOW S. WHEATON.

No. 6267.—*Improved Gold Washer.*

What I claim as my invention and desire to secure by letters patent, is the method of separating gold from earthy matter, by means of a rotating inverted conical pan provided with an internal spiral flanch, substantially as herein described.

WM. H. JENNISON.

No. 6268.—*Concentric Centrifugal Gold Washer.*

Having now explained how my said invention may be constructed and put into practical operation to produce the effect above specifieed—

What I claim as my invention and desire to secure by letters patent, is the machine consisting of two hollow vessels, of convenient thickness and size, placed one within the other so as to leave a space between them, and revolving so as to prepare the gold and mass of other matter with which it is mixed, and also to separate the gold from such other matter, substantially as described.

JAMES H. BULL.

No. 6269.—*Improvement in Cast Iron Car Wheels.*

Having thus fully described our improvements in forming and constructing a solid cast iron wheel, what we claim therein as new, and for which we desire to secure letters patent, is the combination herein described, of arms and flanges or plate, said flanges, or plate and arms being curved substantially in the manner and for the purposes set forth, reference being particularly made to the drawing, for description.

CARMI HART.
NATHAN WASHBURN.

No. 6270.—*Double Hinged Water Guard.*

I do not claim to be the inventor of the single hinged water guard, nor of a mere application of such a guard; but what I do claim as my invention, and desire to secure by letters patent, is the double combined guard, with the lower guard hinged to the upper one, and protected by the lip or outside fender thereto attached; the whole constructed and acting substantially in the manner herein described.

JOHN BURT.

No. 6271.—*Improvement in Hulling Machines.*

What I claim as my invention and desire to secure by letters patent, is first, the combination of the screw section D', of the cylinder with the ribbed or toothed section D, arranged and operating in the manner and for the purpose herein set forth.

DAN PEASE, Jr.

No. 6272.—*Improved Bank Lock.*

I lay no claim to a series of changeable bitts affixed in, or combined with a key, nor do I claim a cylinder to be rotated by a key made with either stationary or changeable bitts, nor the combination of such a cylinder, one or more series of pins or slides, and an enclosing ring, as used in the lock invented and patented by Linus Yale, nor do I claim a series of slides and a notched ring plate, as used in the well-known Bramah's lock; but that which

I do claim as my invention, is a combination of the following elements, as applied to the main bolt of a lock, and operated by a key made with either fixed or changeable bitts, the whole being arranged and constructed substantially as herein before explained.

The first of said elements of combination is a notch, a shoulder, or any mechanical equivalent therefor, made in the main bolt, or otherwise properly applied to it.

The second of the said elements is the spring dog C.

The third of the said elements is the catch plate or lever plate D, turning on a pin projecting from the main bolt, and having a spring affixed to it, and the bolt for the purpose of throwing the plate down into the notches of the slide plates.

The fourth of the said elements is a series of notched slide plates *n*, *n*, *n*, &c., arranged within a cylinder or rotating shaft E, provided with retractive springs, and constructed and made to operate in line of the axis of the cylinder or shaft, essentially as above specified.

The fifth and last of said elements is the rotating shaft or cylinder E, made substantially as above described, and provided with a bitt or stud for operating in a notch *b*, made in the main bolt, and for the purpose herein before specified.

DAVID M. SMITH.

No. 6273.—*Improvement in Brakes for Railroad Cars.*

Having thus fully described the manner in which I construct my horizontal brake and the operation of the same, what I claim therein as new and desire to secure by letters patent, is the application of a truck to locomotive and railroad cars, so as to act upon the track rails, in combination with its several parts, constructed as specified, operating in the manner substantially as described and for the purpose set forth. And it is hereby distinctly understood, that I do not intend by this claim to limit myself to the precise form of said horizontal brake, but to vary the construction and machinery, and apply such as may be deemed expedient, while the effect produced is substantially the same.

LEVERETT TREADWELL.

No. 6274.—*Improved method of ensuring the action of the Valves in direct action Pumping Engines.*

Having thus described our improvements, what we claim as new and desire to secure by letters patent, is the removing or reducing the resistance against the pump piston in direct action steam pumps, at the proper time in the stroke, by effecting a connection between the water on both sides of the piston, in order to allow either the momentum of the moving parts, on the expansion of the steam already within the cylinder, or both conjoined to act as explained, to throw the steam valve across the ports with certainty, whether at high or low speeds.

Second. We claim the method herein described of effecting the before mentioned and claimed object, namely, by making two passages into each end of the cylinder, across one of which the piston is forced, opening by this means free communication between the two ends of the cylinder.

HENRY R. WORTHINGTON.
WILLIAM H. BAKER.

No. 6275.—*Improvement in Bedstead Fastenings.*

I do not claim the invention of the open hook lock, such as Gaunt uses, crossed at right angles, having a bevelled hook on one of the tenons, and a bevelled projection and swell on the other, and large cast iron tenons that enter the posts; but what I do claim as my invention and improvement on Gaunt's patented bedstead fastening and desire to secure by letters patent, is making an oval opening through the tenon of the end rails through which the tenon on the side rail is passed, and forming a spiral bevel around said opening, against which the bevelled projection on the tenon of the side rail acts in the manner of a screw, as it is turned, causing the two tenons thus interlocked to act in perfect unison, and to draw the shoulders of the end and side rails simultaneously against the sides of the posts, and to make perfect joints, without the liability of breaking the spiral bevels, said bevels being of great strength, arising from their continuous and unbroken form, the parts sustaining each other around the oval opening, by which a simultaneous movement of the posts toward the shoulders of the rails is effected, by simply turning the two side rails, as above described.

JOHN D. SANBORN.

No. 6276.—*Improvement in Carriage Springs.*

What I claim as my invention and desire to secure by letters patent, is—

First. Making the plates of elliptic and other carriage springs, of a transversely or diagonally crimped, flutted or ribbed form, substantially as herein described, by which they are rendered universally flexible, and can be made of a given strength with less material and expense than the common elliptic spring.

Second. The combination of the crimped spring, with a semi-elliptic many leafed spring, in the manner and for the purpose herein set forth.

HIRAM T. HYDE.

No. 6277.—*Improved Punching Machine.*

What I claim as my invention and desire to secure by letters patent, is the combination of the knuckle and its attached lever with the toggle G, and connecting rods E, arranged and acting as described, so that by a motion in one direction of the lever the punch can be both raised and depressed.

STEPHEN KENDALL.

No. 6278.—*Improvement in Metallic Pens.*

What I claim as my invention and desire to secure by letters patent, is—

First. The providing the pen with a slit or opening extending nearly through its entire length, substantially in the manner and for the purpose herein described.

Second. And in combination with such slit I claim forming an oblique pen, substantially in the manner herein described.

MATTHEW S. FIFE.

No. 6279.—*Combination of Ash Trap with Puddling and Re-heating Furnaces.*

What we claim as our invention and desire to secure by letters patent, is making a depression in the roof of re-heating or puddling furnaces, in front of the arresting bridge, that is, between the fire and a bridge next to the heating or the puddling bottom, for the purpose of throwing down and arresting the solid particles of coal, ashes, and other matter upon a space or chamber provided for the purpose, substantially as described, in combination with the heating or puddling bottom or bottoms of re-heating or puddling furnaces, whereby the iron under treatment is protected from the injurious effects of the solid matters carried up from the grate by the draught or blast, as described.

LEWIS SCOFIELD.
EDWARD COOPER.

No. 6280.—*Improved method of mounting Porcelain Roses for Doors.*

I claim as my improvement, the metallic socket, constructed substantially as above described, in combination with a mineral porcelain or glass rose, the whole being arranged, adapted together, and used substantially in the manner herein described.

JAMES BELL.

No. 6281.—*Improvement in Dress-pins.*

My claims in the above described invention for which I desire to secure letters patent, are confined to the construction of dress pins, hair pins, &c., made from *one entire piece of wire or metal*, (without a joint or hinge or any additional metal except for ornament,) forming said pin and combining with it in *one and the same piece of wire*, a coiled or curved spring and a clasp or catch, constructed substantially as above set forth and described.

WALTER HUNT.

No. 6282.—*Improvement in elevating the tops of Piano Fortes.*

What I claim as my invention and desire to secure by letters patent, is the connecting the main portion (A,) of the top of a piano to the body or case of the instrument in such a manner that either its front or rear edge can be elevated at pleasure, to allow a free escape of sound, and enable the performer at the same time to see and be seen; to wit, by means of the metallic hinge bars B B, combined with the said main portion of the top of the piano and inserted into guiding metallic supports and steadying grooves or apertures at each extremity of the instrument, substantially in the manner herein set forth. Not intending however to limit myself to the precise mechanical construction and arrangement of parts as herein represented and described, but to vary the same as I may deem expedient, whilst I attain the same end by means substantially the same.

CONRAD MEYER.

No. 6283.—*Instrument for Drawing Spikes.*

What I claim as my invention and desire to secure by letters patent, is forming the lower end of the metallic bar A, (provided with a handle *a*, at its opposite end,) somewhat after the form of a cima-reversa, and brought to an edge, and attaching to the same by means of a pin or bolt *f*, a curved slotted casting B, made of a bill hook form at one end *c*, and also brought to an edge at that end and bent at right angles at the other *d*, in such a manner that by placing the right angle end of said casting on a solid basis, and grasping the spike or nail between the edges of the casting B, and bar A, and depressing the handle, the spike or nail will be drawn from the material into which it is driven, with the greatest facility, as herein set forth, or in any other mode substantially the same.

PATRICK BRYANT.

No. 6284. — *Improvement in Thrashing Machines.*

What I claim as my invention and desire to secure by letters patent, is the peculiar form of the teeth H, by which cloverseed can be hulled and grain thrashed in the same machine, each of said teeth being a combination of a jagged semi-ellipse, a trapezoid, and a shank, as herein described and represented.

T. N. SHIPTON.

No. 6285. — *Improvement in Bee-Hives.*

What I claim is the manner of combining and arranging the upper and lower rods, or entrance passage, with the main or central hives, as herein set forth; said rods or passages being long and narrow for the purpose before mentioned, and so constructed that while the external communication is cut off, the ventilation may still go on by the means herein above described.

STEPHEN TITCOMB.

No. 6286. — *Improvement in Tailors' Measures.*

Having thus described my invention, I may add that I do not claim the use of a square for protracting garments on the cloth to be cut, as that instrument has long been in general use for that purpose, nor do I claim taking measures on the person in any way different from that in common use, nor do I contemplate using my tailors' mathematical protractor, for the purpose of taking measures on the person, its great purpose being, as herein described, to delineate correctly such measures on the surface of the cloth.

What I do claim as my invention and desire to secure by letters patent, is the combination with the square of the exterior radial arm *a*, and the interior radial arm *b*, having thereon the several scales divided and numbered as herein represented, for the purpose of protracting garments from measures taken upon the person, in the manner substantially as herein set forth.

'OHN CARPENTER.

No. 6287. — *Improvement in Machines for Dressing Stone.*

What I claim as my invention and improvement and desire to secure by letters patent, is the construction of the staging for carrying the stone, consisting of a moveable platform capable of raising and lowering, in combination with the frame for producing the reciprocating motions, so that these several motions may be had singly or in movements variously combined, substantially in the manner and for the purposes described.

CHARLES WILSON.

No. 6288.—*Improvement in the Spring Lancet.*

What I claim as my invention and desire to secure by letters patent, is the combination of a counter spring (*d*,) and spring catch (*g*,) with the shank of a spring lancet, substantially in the manner and for the purpose herein set forth.

JAMES H. JOHNSON.

No. 6289.—*Improvement in Hulling Machines.*

What I claim as my invention and desire to secure by letters patent, is—

First. The combination of the radial wedge formed rubbers D^2, and segment wings D^3, on the lower end of the cylinder D, arranged and operating in the manner and for the purpose herein set forth.

Second. I claim constructing the horizontal bed plate of the stationary cylinder, with curved segment ribs around the centre of the bed plate in combination with the radial ribs, arrranged and operating in the manner and for the purpose set forth.

DAN PEASE, Jr.

No. 6290.—*Improvement in Skiving Leather.*

What I claim and desire to secure by letters patent, is the combination of the blade C, roller D, and inclined or horizontal carriage A, as seen in figs. 4 and 3, for pressing down and skiving to a bevel, or to a level or even thickness the leather, as described.

I also claim the combination of the eccentric (G,) and springs (E,) with the clamp (B,) as an apparatus for confining and disengaging the leather, in the manner above described.

BENJAMIN S. MATHEWS.

No. 6291.—*Improved Nail Plate Feeder.*

Having thus fully described the machine or nail feeder, what we claim as the invention of the said William Diehl, deceased, and which we desire to secure by letters patent, is the combination and application of the rack wheel P, its axle and the springs upon it, and the outside wheel O, the ratchet Q, and the two levers J and K, for pushing and holding it, and again letting it be drawn back by the weight, in the manner and for the purpose herein set forth.

HANNAH DIEHL.
CHARLES M. DIEHL.

No. 6292.—*Improvement in Cooking Stoves.*

What I claim as my invention and desire to secure by letters patent, is the combination of the perforated plate G, with the revolving tables E, E, and cylinder F, for the purposes above set forth.

I also claim as my invention, the manner of using the moveable grate, adjusted by a lever, in the bottom of the cylindrical furnace.

FITCH R. BABCOCK.

No. 6293.—*Improvement in Shaving Brushes.*

What I claim as my invention and desire to secure by letters patent, is the introduction of the soap, by means of the screw and tube, through the handle into the brush, by which it may be fully impregnated; and also the combination in *one* of the box and brush, thereby saving time and trouble, for it is only necessary to wet the brush, and while the lather is making on the face the beard is softened.

W. S. JEWETT.

No. 6294.—*Improvements in Planing Machines.*

Having thus described my invention, what I claim as new and desire to secure by letters patent, is the method of holding the board firmly against the bearing bench or roller of a planing machine, by means of the obliquely placed rotary guides, firmly pressed against the edge of the board, and drawing it to the bed in the manner substantially as herein set forth.

I also claim the oblique rotary guides, herein described, in combination with a cutter wheel, having bevels or off-sets around its face, and also with the adjustable plates in front of the smoothing cutters set in its plane face, as herein set forth; not confining myself to the precise arrangement described, but varying it to obtain the same ends by means substantially the same

HAZARD KNOWLES.

No. 6295.—*Improvement in the manufacture of Twine.*

Having described the nature of my invention or improvement, and the manner in which it is applied, I do not claim the saturating of yarns or strands of cord or twine with tar, and twisting said yarns or strands, while so saturated, into cord or twine, as the nature of such tar would be weakening and soiling, and not adapted to the end and objects designed to be attained by this invention; nor do I claim, generally, the application of gelatin, glutin, starch, or glue, to twine or cord for the purpose of sizing—I disclaim the substances used as sizing, separately; and I also disclaim the manner in which it is applied, separately—but I claim the two processes combined, that is to say, I claim the saturating of the cotton yarns or strands separately with gelatin, glutin, starch, or glue, or any convenient combination or composition of these or any other viscous or analogous substance, while in a liquid state, preparatory to and for the purpose of being twisted, and in combination with the twisting the said cotton yarns or strands, while so wet and saturated, at one operation, into twine or cord, thereby producing the results herein before set forth; and, therefore, by so twisting it, in combination with the saturating of the yarns at one operation, I both save time and expense in the process of manufacture, and at the same time produce a better article, for the purpose of untarred wrapping twine, than is produced by any other known process, thereby giving the article an internal saturation with these tenacious and preservative substances, which imparts strength, as aforesaid, superior to a tar saturation, without the weakening and soiling properties of tar.

THOMAS G. BOONE.

No. 6296.—*Improvement in machinery for Dressing Shingles.*

Having thus described my improved machine, I wish it distinctly understood that I lay no claim to the mere invention and use of two knives, arranged and operated as above described, and for the purpose of shaving a shingle, but that which I do claim as my improved organization or combination of mechanism for holding, shaving and discharging the shingle, the same consisting of the following elements, as constructed and made to operate substantially as specified, that is to say—1. The knife frames D, E, and cutting knives. 2. The system of pressure rollers and their supporting springs. 3. The spring holder I. 4. The bearer C. 5. The spring holder K. 6. The spring discharging and receiving bars o^2, p^2—meaning to claim the spring holders, the bearer, and the spring receiving and discharging bars, in combination with one another and the cutting planes, and as constructed and made to operate therewith, substantially as above described.

LEWIS STOCKWELL.

No. 6297.—*Undetachable Swinging Bottle Stopper.*

Having thus fully described my improved bottle stopper, what I claim therein as new and desire to secure by letters patent, is the manner of closing the mouth of a bottle by means of the undetachable metallic cap A, having cork or India rubber, or both, placed in the top of the same, and secured to the neck of the bottle, by means of the ring *c*, the joint pins *f*, *f*, and the grooves *d*, in the bottle neck, substantially in the manner herein set forth.

ARCHIBALD H. FORBES.

No. 6298.—*Improvement in Churns.*

Having thus fully described the nature of my improved churn, and shown the operation of the same, I wish it to be understood, that I do not claim either of the individual parts or devices herein described, when taken separately and alone; but what I do claim as constituting my invention and desire to secure by letters patent, is the particular manner in which I have combined and arranged those parts, so as to adapt them to the churning of cream, as set forth, that is to say, I claim the combination upon the same shaft of two spiral float wheels, so arranged as to force the cream from the ends of the churn box towards the centre, as described and represented.

HENRY F. BAKER.

No. 6299.—*Folding Centre Board.*

Having thus described the construction and operation of my improved centre board, and the manner in which the same may be applied to flat bottomed vessels, what I claim therein as new and desire to secure by letters patent, is—

First. What I claim in the foregoing as my invention and for which I solicit letters patent, is suspending in a jointed frame a centre board composed of one or more pieces capable of being turned with either their edges or sides to the bottom of the vessel, and with the frame folded up against or projected down therefrom, as herein set forth, whether the several parts be arranged as described, or in any other substantially similar manner.

And likewise hanging the above claimed apparatus, so that it is capable of being turned obliquely across the keel for the purpose of counteracting the lee way of the vessel, substantially as herein set forth.

J. M. HOFFMAN.

No. 6300.—*Improvement in Machines for cutting Gaiter Boots.*

I therefore claim as my invention and desire to secure by letters patent, the machine with heads, with or without a division, with patterns adapted to its use, consisting of cutting and moulding ladies' and gentlemen's gaiter and half gaiter boots to any size, of any material, without a seam—thereby saving fifty per cent. in labor, and surpassing the old plan in neatness and durability.

WILLIAM SNELL.

No. 6301.—*Improved Air Engine.*

What I claim as my invention and desire to secure by letters patent, is combining with the surrounding cooling vessel, a hollow plunger, made with its

external and internal surfaces of some conductor of caloric, separated by some non-conductor, substantially in the manner and for the purpose specified.

And I also claim the hollow plunger, substantially as herein described, in combination with the heater, which it alternately covers, substantially as herein described for alternately heating and cooling the air, as described.

J. LAUBEREAU.

No. 6302.—*Improvement in Extension Tables.*

I do not claim to have invented any of the parts used herein for these purposes, as taken separately they are well known; but I do claim as new and of my own invention, and desire to secure by letters patent of the United States, the application to extension tables of slides formed with alternate and interrupted tongues and grooves *ff*, in the faces, to carry the weight off and on the table, and kept together by metal stops *b* and *e*, and slide keeper pieces *a* and *d*, having lips to operate in grooves *c*, on the edges of the slides for that purpose, substantially in the manner described and shown.

THEODORE FRANCK.

No. 6303.—*Revolving Cradle for unloading Canal Boats or Sections thereof.*

We do not claim as a platform on which to support the boat or section thereof, any of the dumping cars now in use, none of which would permit the boat or section to be turned completely upside down while resting thereon,—nor do we claim suspending the boat or section thereof from a crane without the intervention of a cradle; but what we do claim as our invention and desire to secure by letters patent, is a revolving cradle suspended on gudgeons, to receive and securely hold a boat, or section thereof, said gudgeons being atached either to a railroad truck or the bail of crane, or other hoisting machinery, in such a manner that the cradle may be revolved to such an extent as to turn the boat or section upside down, substantially as described in the within specification.

JOHN ELGAR.
BENJAMIN HALLOWELL.

No. 6304.—*Improvements in Planes for Bevel Edges.*

What I claim as my invention and desire to secure by letters patent, is the manner herein described of planing the edges of pieces of wood of a bevelled form at given uniform or varying angles, by means of an adjustable guard hinged to the plane stock.

WILLIAM H. BLYE.

No. 6305.—*Machine for regulating the Twist and Diameter of Screw Augers.*

We do not claim as our invention the plates or dies, as such, neither do we claim any other of the parts or combinations of the machine, except as follows, to wit: We do claim as our invention and improvement and desire to secure by letters patent, the raising upon and securing to the surface of level metallic or other plates, composed of hard substance, wales or beads, running either in straight or curved lines, and operated substantially in the manner

above specified for the purpose of forming and perfecting the twist of double and single twist screw augers.

NATHANIEL C. SANFORD.
LUCIUS B. SMITH.

No. 6306.—*Sliding Cut-off Valve.*

I claim the method of constructing and arranging sliding valves of steam engines, with their corresponding openings into steam passages, together with the regulating apparatus attached to said valves, so as to operate the cut-off valves by the same rod which moves the eduction valves, also so as to permit the adjustment of the cut-off valves, in such manner as to close the steam passages, at various preconcerted portions of the stroke by hand gearing during the operation of the engine, all in manner and form as set forth in the within specification and drawings.

SIMON P. WINNE.

No. 6307.—*Improvement in Fan Chairs.*

What I claim as my invention and desire to secure by letters patent, is the manner herein described of diffusing perfumes and producing currents of air to fan and cool the occupants of either stationary or rocking seats by means of bellows and tubes, whether the several parts be arranged and operated as herein set forth, or in any other substantially similar manner.

DANIEL LINZIE.

No. 6308.—*Improved Rotary Gold Washer.*

What I claim as my invention and desire to secure by letters patent, is the application and combination of the helix or screw *h h*, with a revolving cylinder *a*, and the short strips *k k*, at the upper end of the cylinder, substantially in the manner and for the purpose herein before named.

H. PARRY.

No. 6309.—*Improvements in Planing Machines.*

What I claim as my invention and desire to secure by letters patent, is combining with stationary cutters in a planing machine, reciprocating clamps which increase their pressure as the resistance to the advance motion of the board increases in such manner that said clamps give a rapid intermittent or reciprocating motion to the stuff, whereby the clogging of cutters is prevented, and smooth work secured, substantially in the manner herein set forth.

I also claim the passage V, and the scraper *n*, arranged and operating as described, in the rear of the throat of the plane, for freeing the plane from stray shavings, and for preventing the clogging of the cutters, in the manner substantially as herein set forth.

I also claim the gauging pressure spurs *i*, placed in front of the plane cutters for retaining the board in its due position in contact with the bed of the plane frame Q, as herein set forth, not intending in these claims to limit myself to the exact arrangements described, but to vary the same at pleasure, while I attain the same ends by means substantially the same.

HERVEY LAW.

No. 6310.—*Machine for Carving Wood or Metal.*

What I claim as my invention and desire to secure by letters patent, is combining with a rotating cutter, which has only an endwise motion for determining the depth cut, substantially as described, a compound sliding table (which carries the material to be carved) operated by a system of pentagraph levers provided with a pointer or tracer, that all the motions given to the tracer may be communicated to the material to be carved, substantially in the manner and for the purpose specified.

ISAAC M. SINGER.

No. 6311.—*Machine for making Suspender Buckles.*

What I claim as my invention and improvement, and desire to secure by letters patent, is the combination of the dies with the central joint of the toggle (*g g*,) for holding the wire, and forming the recessed figure upon it, as described, the combination of the cross head (*d*,) arms (*h h*,) and lever (*c c*,) operating together as described. I also claim the combination of the levers (E,) and pointers (S,) arranged within the die, and acted on by the levers (*c*,) for punching the holes in the ends of the bow, the whole made and operated as shown in figs. 4 and 5; I also claim the safety bar (*f*,) operated by the cam (*i*,) against the toggles, for the purpose of keeping the toggles in their straightened position until the punching machine is withdrawn, and thereby permit the discharge of the finished bow, as described.

WM. SCARLETT.

No. 6313.—*Apparatus for Drilling Submarine Rocks.*

What I claim as my invention and desire to secure by letters patent, is the adjuster D, with its cap, lens, adjusting screws, elastic circles, and circular pads. I also claim the combination of the chamber A B, with the adjuster D, tube G, adjusting pins J, and with the guide posts R R, constructed and arranged substantially as herein described.

THOMAS KENDALL.

No. 6314.—*Improvement in Bedsteads for Invalids.*

Having thus described the construction and operation of my improved bed stead for invalids, what I claim therein as new, and desire to secure by letters patent, is first, the combination of the adjustable suspension frame *c* and *d*, with the fixed frame *a*, the several parts being made and arranged substantially in the manner and for the purpose herein described.

Second. The combination of the sheets, and the rollers upon which they are wound with the bedstead, substantially as described.

Third. The combination of the shower box and steaming apparatus, with the curtained compartment, substantially as herein described.

ISAIAH BUCKMAN.

No 6315.—*Improvement in Spectacle Frames.*

What I claim as my invention and desire to secure by letters patent, is making the *temples* of spectacles, either in whole or in part, *hollow or tubular*, of either a cylindrical, square, or any other shape, said temples operating substantially in the manner and for the purpose herein above set forth.

JOSEPH. J. LOW.

No. 6316.—*Improvement in Looms for Weaving.*

What I claim as my invention and desire to secure by letters patent, is the method substantially as herein described, of withdrawing the wires from the raised warp or figuring of the fabric, carrying them forward and replacing them again in the shed by means of rolls, receiving their different motions from machinery arranged as herein set forth, or in any other substantially equivalent manner.

I also claim giving to the shuttle box a vertical alternating motion, for the purpose of directing the shuttle through the shed, alternately above and below the ground warp, when the ground warp remains constantly stretched in the same plane, and the shed is formed simultaneously with the elevation and depression of the shuttle box, by the alternate deflection of the covering warp above and below the ground warp, substantially as herein set forth.

AUGUSTUS FAULKNER.

No. 6317.—*Improvement in Distilling Apparatus.*

What I claim as my invention and desire to secure by letters patent, is distilling and rectifying spirituous liquors and turpentine by causing a current of steam to pass up through a series of perforated metal, slate, soap stone, or other plates securely fixed in a steam tight vessel, and provided with drop pipes and receivers below, through or over which the wash or other article is descending; the apparatus therefor being constructed substantially in the manner described.

I also claim the use of slate or soap stone plates for this purpose, with or without the combination of the drop pipes and receivers, made and used as described.

GEORGE RILEY.

No. 6318.—*Improved method of expanding Metallic Pistons.*

What we claim as our invention and desire to secure by letters patent, is the setting out or tightening of metallic packings by means of the series of cams *e e e*, in combination with the sliding rods *f f f*, and with the springs *r r r*, when the whole are operated simultaneously, by turning the single cam head or shank A, substantially in the manner herein set forth.

We do not intend in this claim to limit ourselves to the exact number or arrangement of parts herein described, but to vary the same at pleasure, while we attain the same ends by means substantially the same.

JAMES TOUCHSTONE.
J. H. CLARK.

No. 6319.—*Improvement in Straw Cutters.*

Having thus fully described my improvement, what I claim as my invention, and for which I desire to secure letters patent, is the combination of the toggle joint with the crank shaft *h*, for the purpose of operating the knife, and giving the double or accelerated motion, substantially as above set forth.

ISRAEL J. RICHARDSON.

No. 6320.—*Improvement in Corn Shellers.*

Having thus fully described my improved apparatus for shelling corn, what I claim therein as new, and for which I desire to secure letters patent, is first,

the projections or horns o', with the angular notches X, between the horns and the front edge of the jaw, for removing the grains or rows of corn that pass between the angles of the jaws; secondly, I claim in combination with the jaws, the guides i, constructed and operated as described, for stripping the grain from the cob when moved forward by a piston or its mechanical equivalent.

ISRAEL J. RICHARDSON.

No. 6321. — *Improvements in Cog Gearing of Locomotives for ascending Inclined Planes.*

What I claim as my invention and desire to secure by letters patent, is first, the combination of the intermediate cog wheel H, with the pinion G, on the propelling axle F, and stationary cogged rail r, into which the intermediate cog wheel H, is made to match or gear when required for ascending inclined planes; said intermediate cog wheel being hung upon a moveable shaft, and kept in gear with the rack by means of a weight or spring, whereby difficulties arising from the inequalities in the road, or others, incident upon the use of a rack and pinion for ascending inclined planes, are avoided as herein fully set forth.

Second. I also claim the mode of locking, by the employment of the cog wheels S and T, in combination with the pinion G, and intermediate cog wheel H, and rack rail r, as described.

WM. HOYT.

No. 6322. — *Improvement in Endless Bands for Grain Dryers.*

Having thus explained my invention, I do not claim an endless web or apron made of metal, but I claim the combination of an endless apron made of various pieces of plate metal constructed with joints, united by axles which project below the inner surface of the web or apron, with octagon or hexagon rollers, constructed with grooves in the said rollers, to receive the projection or axles of the endless apron, (meshing into one another) the whole constructed and operating in the manner herein set forth.

JOHN MASSEY.

No. 6323. — *Vibrating Sash Stopper.*

Having thus explained the nature of my invention, and its operation, I claim the combination of the key, fig. 2, with the escutcheon J, and the catch button D, operating as described, to make the catch button project into the rack side of the sash, to hold or retain the window, substantially as described.

WM. FERRELL.

No. 6324. — *Piston Valve Cut-off.*

What I claim as my invention, and desire to secure by letters patent, is the cut-off, composed of two cylindrical portions or rings working steam tight with the sides of the steam chest, and also fitting steam tight, when brought alternately in contact with the flat surfaces of two pistons, between which said cut-off works, whereby steam is prevented from passing into the working cylinder of the steam engine, while either the cut-off alone, or the cut-off and piston together, are passing by the steam passage, said cut-off being moved by the pistons, and attached to each other, substantially in the manner herein described.

GORDON McKAY.

No. 6325. — *Revolving Die Spike Machine.*

What we claim as our invention in each set of griping and beading dies of the series, is the combination of the fixed die n, the moveable die O, the curved bar P, the cam plate Q, with its cam, and the arc or cam R, the said being applied to the shafts M T, and adjusted together, and made to operate essentially in manner as herein before specified.

We also claim the combination of the series of rotating pointing and severing dies A B C D, the conductor L, and the series of griping and beading dies, as constructed, combined and arranged, and made to operate substantially as herein above described.

AMI M. GEORGE.
EPHRAIM BROWN.

No. 6326. — *Improvements in Machinery for Cutting Veneers, &c.*

What I claim as my invention, and desire to secure by letters patent, is the method of cutting veneers, substantially as herein described, by means of a knife (or knives,) having a longitudinal sliding or vibrating motion during the operation of cutting, when this is combined with a box (or boxes) on a rotating shaft, that by its revolutions it may carry the block to and over the knife, substantially as herein described, whereby the operation of cutting veneers by means of a sliding or vibrating knife to give the draw cut, may be made continuous, as described.

And I also claim the method, substantially as herein described, of communicating the feeding motion to the follower (or followers) in the feeding box (or boxes) by means of the arm (or arms) so connected with the main shaft, or the equivalent therefor, that it may have a motion independent thereof, and connected with the follower (or followers) in the feed box (or boxes) and operating as herein described, or in any other manner essentially the same in principle.

E. B. CHEREVOY.

No. 6327. — *Improvement in the Manufacture of Paris Green.*

What I claim as my invention, and desire to secure by letters patent, I specify and point out as follows, viz:

First. The process of dissolving the blue vitriol by pouring on it while the vitriol is in a dry state, the hot saturated solution in water of arsenic and carbonate of soda, as described in paragraph B.

Secondly. The process of dissolving the dry carbonate of soda by pouring on it the hot saturated solution in water of the arsenic and blue vitriol, as described in paragraph G.

Thirdly. The combination of the process described in paragraph B, or the process described in paragraph G, with all the several steps above described, and marked with the letters A, C, D, E and F; and also the combination of either of the said processes described in section B, and section G, with any of the above named steps described in sections A, C, D, E and F.

THEO. SCHWARTZ.

No. 6328.—*Improvement in Electric Telegraphs.*

It is not deemed requisite to describe or refer to the voltaic, or any other source of electricity, nor is it intended to claim the application of that, or any other electric source to these purposes; nor is it intended to claim any of the parts employed herein, irrespective of the uses to which they are severally put, as herein described.

But I do claim as new and of my own invention, and desire to secure by letters patent of the United States,—

First. The composing of electro-telegraphic communications by making groups of perforations through paper corresponding with, or representing the signs to be transmitted, irrespective of the general arrangement of the collective or individual signs, and irrespective of the mechanical means employed to make the perforations.

Second. The application of paper, so perforated, to open and close an electric circuit, or several successive circuits, thereby transmitting the electric current or currents in successive pulsations that correspond with the perforations in the paper, substantially in the manner described and shown, but including any merely practical or convenient variations of the mechanical means or materials or fabrics employed that are analogous or equivalent in their operations and effects.

Third. The application of any suitable chemically prepared paper, without regard to the chemical ingredients used for such a purpose, to receive and record signs, forming communications, such signs being made by the pulsations of an electric current or currents transmitted from a distant station, said current operating directly, and without the intervention of any secondary current, or mechanical contrivance, through a suitable metal marking style, that is in continuous contact with the receiving paper, thereby making marks thereon, which marks correspond with the groups of perforations in the paper composing the transmitted communication, or may be given by the pulsations from the spring 45, and block 46; so that in either case these form the received communication, substantially in the manner and with the effects described and shown, including any merely practical variations analogous and equivalent in the means employed and the effects produced thereby.

ALEXANDER BAIN.

No. 6329.—*Improvement in Hooks and Eyes.*

Having now described my invention of "an improved fastening for dresses," and the mode of carrying the same into use, I wish it to be understood, that I lay no claim to the mode herein shown, of applying the hooks and eyes to garments as they may be applied by sewing if preferred, and the strips of whalebone may be dispensed with when thought desirable, but I claim the constructing of hooks with a projecting piece beyond the root of the tongue, for the purpose above explained.

HENRY McEVOY.

No. 6330.—*Improved Skate.*

What we claim as our invention and desire to secure by letters patent, is forming the upper iron part B, of the skate, with segmental spaces *d*, at the forward and heel part, and an oblong opening *e*, near the centre, and providing the same with a curved spring F, near the centre, for relieving the shank

of the foot, and an inclined curved plate G, at the heel, and rings E, and rollers H, on either side, and securing the same to the runner by dove-tailed or other formed projections *a b*, on the upper edge of said runner, entering corresponding formed slots in the upper part, and further strengthening the attachment by projections C, on the lower surface of the upper part on either side of the runner, through which and the runner bolts or rivets *g*, are inserted in such a manner as to render the skate strong and durable, and to dispense with the usual heel strap, as herein set forth.

ALEX. BARCLAY.
CH. W. BONTGEN.

No. 6331.—*Improvement in Machinery for Cleaning Hair.*

Having thus fully described our improved machine for opening and cleaning matted hair—

What we claim as our invention and desire to secure by letters patent, is the combination of a chamber in which are placed a series of elastic arms that are simultaneously made to vibrate as the disk from which they project is revolved, with another chamber in which are placed a series of tension cords that are made simultaneously to vibrate as the disks to which they are made fast are rotated; the arrangement of the two chambers and the manner of operating upon the hair, being substantially as herein represented and described.

JOHN RADEBAUGH.
JOHN A. MATLACK.

No. 6332.—*Improved Machine for making Carpenters' Squares.*

I do not claim pressing the square or rule blanks upon chisels or dies, but what I do claim as my invention and desire to secure by letters patent, is graduating squares and rules by means of an arrangement of chisels which are moveable either between or through bars, and are pressed upon the square by any known mechanical device or power, substantially in the manner herein described.

Also, I claim what is termed stamping squares, or putting on the figures by means of dies arranged as the chisels are, and acting in substantially the same manner.

JEREMIAH ESSEX.

No. 6333.—*Improvement in Apparatus for making Soda Water.*

What we claim as our invention and desire to secure by letters patent, is the employment of a perforated ball or fountain, in the manner set forth, for the purpose of making an effervescent beverage, or a drink, saturated with carbonic acid gas called soda water.

SOLOMON ANDREWS.
J. F. HALSEY.

No. 6334.—*Railway Propeller.*

What we claim as our invention and for which we desire letters patent, is the combination of the revolving disk with the legs *m n*, and straightening rods *a b*, attached to it, and the eccentric slots which are constructed in fixed pieces of metal, and act upon the rods; the whole constructed and arranged

substantially as herein described, and constituting a propeller to be attached to a locomotive.

R. G. HATFIELD.
OLIVER P. HATFIELD.

No. 6335.—*Improvement in machinery for separating Flour from Bran, &c.*

Having thus fully described our improved machine for extracting flour from bran, &c., after it has been bolted, what we claim therein as new and for which we desire to secure letters patent, is the combination of a runner, concave, and their adjustment one to the other, substantially in the manner and for the purposes above made known.

EDWIN CLARK.
JAMES M. CLARK.

No. 6336.—*Improvement in Cultivator Teeth.*

What I claim as my invention and desire to secure by letters patent, is the self-sharpening four pointed plate for a cultivator, with its iron bed, each of the four to be used successively, but when two have been used the plate is to be turned over, bottom side up, (that is, the rear made front,) in order to use the other two.

JOSEPH S. HONEY.

No. 6337.—*Improvement in machinery for taking and laying Paper from the Cutting Engine.*

What I claim as my invention, is the moveable platform, table, or sheet receptacle S, in combination with the system of endless tapes, and their supporting rollers, and applied to the paper making engine machinery, by which the sheets of paper are separated from the web thereof, and delivered to said system of tapes or endless bands and rollers, or any other equivalents therefor, or as applied to any contrivance or machine from which sheets of paper are to be received, and evenly packed or piled, as above described.

JOHN M. HOLLINGSWORTH.

No. 6338.—*Improvement in Trusses.*

Having thus fully described my improved instruments for the various kinds of hernia, and the manner of applying the same to each case, what I claim therein as new and for which I desire to secure letters patent, is an improvement upon the abdominal supporter, spring and illiptical pad, patented by me in 1835, by attaching the pads to the spring or supporter, so as to be moved into any position required, by means of adjusting screws, fissures and slides, the pad having a perpendicular motion, allowed by the fissure in the block riders, as set forth.

I also claim, in combination with the side springs, the straps to regulate the pressure, substantially as described.

I also claim the abdominal supporter boundary above the hernial pads, forming an opening between it and the lower boundary, and which is intended to sustain the abdominal viscera, and prevent its encroachment upon the internal abdominal ring.

I also claim the mode of closing the internal ring in inguinal hernia, as set forth, by leaving the upper portion of the abdominal canal and internal ring free, as above specified.

J. W. HOOD.

No. 6339.—*Improvement in Planing Machines.*

We are aware that planing machines have been made with cutters on the face of the cutter wheel, but in such cases the face of the wheel has been, necessarily, set slightly inclined to the face of the carriage, to prevent the cutters scratching the surface, which had been already planed, and, therefore, would leave the article slightly hollowed out in the centre throughout its whole length.

And that cams have been used to regulate the cutting of cutters in machines used for various purposes. And that the cutter wheel has been so situated as to be susceptible of being slightly elevated and depressed.

And the pinions have been so arranged as to be thrown into and out of gear at pleasure. And that double levers acting on eccentric rollers have been used as binder in machinery. And that anti-friction rollers have been used to steady the board while being planed—we, therefore, claim none of these, as such, as our invention; but,

What we claim as our invention and desire to secure by letters patent, is the method of governing the sets of cutters, by the use of a cam in the central part of the cutter wheel, (whether above or below,) which will move the slides with diagonal grooves, so as to draw back the sets of cutters on one side of the cutter wheel, while those on the opposite side are cutting, that is, drawing back each set of cutters, alternately, soon after it leaves the edge of the board or other article being planed, so as to avoid scratching the planed surface as it is coming out from under the cutter wheel, while the face of the cutter wheel is parallel to the face of the carriage; and the combination of the method of shifting the cam, so as to plane equally well when the carriage is running either way, with the method of elevating and depressing the cutter wheel to conform to the thickness of the board or other material being planed; the whole constructed, arranged, combined and operating, and for the purposes substantially as herein described.

JOB SHELDON.
J. S. BARDEN.

No. 6340.—*Improvement in Tan Vats.*

I do not claim a tan vat, nor a box with perforations in the side and bottom, nor a rising and falling hide frame, nor a windlass to operate the several moveable parts of the vat; but,

What I do claim as my invention and desire to secure by letters patent, is the employment of the separate rising and falling bark chamber A, for containing the bark, in combination with the main vat F, containing the tan liquor, said moveable bark chamber A, being made, arranged and operated in the manner and for the purpose above stated.

TARLTON W. BROWN.

No. 6341.—*Improvement in Blast Generators.*

Having thus fully described my improved rotary blast generator, what I

claim as my invention and desire to secure by letters patent, is the combination and arrangement of the drum heads *a*, *b*, the valve or slip joint *j*, and the conduct, *f*, with the elbow *e*, substantially in the manner and for the purpose herein set forth.

CHARLES C. LLOYD.

No. 6342.—*Improvement in Piano Fortes.*

Having thus described my improved manner of constructing pianos, what I claim as my invention and desire to secure by letters patent, is—

First. The formation of the bottom of a piano of a metallic frame, combined with a wooden frame, or with blocks of wood, as a substitute for the ordinary piano bottom composed of united boards, for the purpose herein set forth.

Second. I claim the formation of the body or sounding portion of a piano, independently of the outside casing, by the combination of the bottom with the requisite blocks and fillings, the sounding board, the rest plank, and the top metallic frame, substantially in the manner and for the purpose herein described.

CHARLES HORST.

No. 6343.—*Improvement in Mortising Machines.*

What I claim as my invention is the afore described combination of the two chisels and mechanism for operating them, so arranged, constructed and operated as not only to cut into the wood or stile, in the manner necessary to form the mortise, but by their combined action to remove the chip or refuse wood therefrom, essentially as specified.

H. B. SMITH.

No. 6344.—*Improvement in Driving Bobbins.*

What I claim as my invention or improvement in the mode of operating bobbins, as invented by the said Francis McCully, Jr., and for which letters patent have been granted to him, and through him assigned to me, and by or through me in part, to others; I still retaining a large proprietorship or interest in the same, is the combination of the flanch *b*, the dead spindle and rotary pedestal, substantially in manner and for the purpose as above specified.

ARTHUR M. EASTMAN.

No. 6345.—*Improvement in Coffee Roasters.*

What I claim as my invention, and desire to secure by letters patent, is making the coffee toaster in a spherical form, provided with journals, in combination with a rim adapted to the form thereof, substantially as described, whereby it can be adapted to the curved boiler holes of cooking stoves, ranges, furnaces, &c., and by which also, it is adapted to the toasting of coffee more regularly than any other apparatus heretofore known.

I also claim making the spherical toaster in two parts, substantially as described, in combination with the divided journals, as described, whereby the two parts can be separated and put together without the necessity of fastenings, as described.

THOS. R. WOOD.

No. 6346.—*Improvement in the Water Ram.*

What I claim as my invention, and desire to secure by letters patent, is the peculiar combination and arrangement of the parts by which the impetus valve is made to work in a cylinder, placed for that purpose within a chamber surrounding it; said cylinder being provided with openings in its sides, which may be enlarged or decreased above the impetus valve, for the escape of the waste water, until its impetus becomes sufficient to act upon and close the valves; the whole constructed substantially in the manner and for the purpose as set forth above in my specification.

ALPHEUS D. SMITH.

No. 6347.—*Curvilinear Blind Opener and Shutter.*

Having thus fully, clearly, and exactly described the nature, construction and operation of my invention, I wish it to be distinctly understood that I do not claim opening and shutting window blinds by means of the quadrant as used in cabinet ware or otherwise; but what I do claim as of my invention, and for which I ask letters patent, is so connecting a window blind with a quadrant slide, made partly firm and unyielding, and curved to suit a quadrant casing, resting flush with the top of the window sill within the house, and partly of links, jointed to suit and attached to the blind, that by means of a handle grooved to play in a slot in the quadrant casing, and screw threaded where it passes through the slide, the blind can be thrown open and held at any angle, and forced back against the wall, the links of the slide being made to lie close to the blind at the same time that they hold it firmly to the wall by a slight retrograde movement of the handle, and screwing the handle and the slide fast to the casing, in the manner and for the purpose described.

R. B. ROLLF.

No. 6348.—*Improvement in Boxes for Railroad Cars.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the tight oil cup with the axle, so constructed that said cup shall be constantly crowded up towards its cap I, as the composition bearing box is worn by the axle S, thereby indicating the condition of said box by the space M, becoming closed.

ROBERT LIVINGTON.

No. 6349.—*Improvement in Cooking Stoves.*

Having thus fully described my improvements, what I claim therein as new, and for which I desire to secure letters patent, is first, forming a compound flue, substantially as set forth, by conveying the smoke flue around the bottom and sides of the oven, and an air flue so arranged as to convey off the surplus heat from the top of the oven to the bottom of the stove, by which the heat is concentrated there in any proportion desired. I also claim extending the air chamber up the front, where it can be used for roasting, substantially as herein described. I also claim in combination with the flue *z*, the drop damper or door *i*, in the fire chamber, to open communication with the ash pan for the purposes above designated.

B. T. RONEY.

No. 6350.—*Improvement in Mortising Machines.*

What I claim as my invention, and desire to secure by letters patent, is the employment of an endless chain of cutters for cutting mortise grooves, &c., the cutters being formed on the outer edges of the links, substantially as described, in combination with the wheel (g,) around which the chain passes, and which is mounted on their standards, so that the wheel and standards shall be of less thickness or width than the whole width of the cutting edges, substantially as described, whereby a mortise groove or gain may be cut by a continuous rotary motion, of greater depth than is due to the depth of the chain and the semi-diameter of the wheel around which the chain passes, as described.

JOHN. J. WEEKS.

No. 6352. —*Improvement in Machinery for Dressing Staves.*

I am aware that machinery has been made, by means of which both sides of the stave have been dressed at the same time, and also that feeding rollers and friction rollers have been long used for feeding the material to the cutters, and that revolving cutters have long been used; I therefore claim none of these, as such, as my invention; but what I do claim as my invention and desire to secure by letters patent, is so constructing the whole machine, that the rim or circle which carries the cutters for dressing the outer or convex side of the stave, may be firmly attached to, and sustained by strong arms connected with a substantial wheel on the same arbor, axle or shaft as the other cutter wheel, so that the two cutter wheels may revolve in the same direction, and in the same time, and so that the cylinder within the arms that sustain this rim or circle, (having the back end closed) may receive the staves as they fall (after being fully dressed) and prevent them from clogging the wheel, and in placing the other cutter wheel at such a distance from the open end of the cylinder as to allow convenient room to remove the staves at pleasure; the whole constructed, combined and arranged, substantially as herein described.

GEO. GILBERT.

No. 6353.—*Improvement in Abdominal Supporters.*

We are aware that a rack and click or dog has long been used for trusses, and that four back pads attached to springs have long been used for abdominal supporters; we therefore claim none of these as such, but we claim the combination of the two ratchets and spring clicks or dogs, with the main spring and front pad, so arranged as to enable the wearer to regulate the pressure of the whole pad, or either end of it at pleasure; the whole constructed, arranged, combined and operating, and for the purposes substantially as herein described.

HERBERT R. HUBBARD.
GEO. W. HUBBARD.

No. 6354.—*Cut-Nail from Muntz's Metal.*

I wish it distinctly understood that I lay no claim to the invention of either a cast copper nail, or a cast composition nail made of copper and zinc, combined in different proportions from that in which they are combined in the yellow metal, (known in commerce as Muntz's sheathing metal,) or combined in the same proportions and with some other metal; but what I do claim as my invention is the new article of manufacture herein above described, viz: a "yellow metal" nail, made by cutting and heading it in a nail machine, meaning by the term yellow metal, a metal composed of copper and zinc, in the proportions in which they are usually combined in the manufacture of the well known "Muntz's sheathing metal."

SAMUEL L. CROCKER.

No. 6355.—*Improvement in Carriage Brakes.*

I do not claim the pendent rubbers, nor the crank axle and arms for bringing the rubbers against the peripheries of the wheels; but what I do claim as my invention and desire to secure by letters patent, is the mode of turning the crank axle C, to actuate the rubbers B, by means of the combination and arrangement of the connecting rod G, and eccentric wheel E, with the axle K, of the car to which the brake is applied, as above set forth, by which the engineer may cause the break to act gradually or instantaneously, and most effectually, at a moment's warning, for retarding or stopping the motion of the car.

AMOS B. McFARLAN.

No. 6356.—*Improvement in Musical Instruments.*

My improvement and what I claim consists in the modulating, disseminating chamber which encloses the valves, in combination with the swell chamber and reeds, all as specified; the said modulating chamber serving to properly disseminate the sound before it is allowed to enter the swell chamber.

JOSEPH W. PRESCOTT.

No. 6357.—*Improvement in Daguerreotype Apparatus for Panoramic Views.*

We do not claim increasing the number of cameras as an invention, and we do not claim to have invented any of the parts described or used herein, irrespective of the particular manner in which we have so used them for these purposes, as all such parts taken separately are well known; but we do claim as new and of our own invention, and desire to secure by letters patent of the United States, the application of the lengthened slides $c\ c$, either to act in opposite directions on one camera box, or on a plurality of camera boxes, for the purpose of taking daguerreotype representations in successive parts or sections, and effecting the junction, or matching of successive sections by combining with the foregoing parts the adjustable lip 4, for the purpose of shutting off any stray reflections from the parts already operated on while the next successive part is operated on, or of shutting off the stray reflections at the commencement from that part of the daguerreotype plate that is to be operated on after the first portion, substantially in the manner and for the purposes described and shown.

ISAAC VAN BUNSCHOTEN.
JOHN J. WOODBRIDGE.
WILLIAM E. MANN.

No. 6358.—*Improvement in Grates for Coal Stoves.*

What I claim as my invention and desire to secure by letters patent, is the manner of lifting the grate to its place by means of the plate a, attached to the under side of the grate, combined with the piece o, on the back of the drawer. as herein described.

CALEB ISBISTER.

No. 6359.—*Improved Piston Ring, and method of deriving motion therefrom in Rotary Engines.*

What I claim as new and useful and for which I desire letters patent, is the moveable ring with cogs or teeth on its inner surface or sides, and with the incline or wedge pistons on its upper surface, and moving in the inside of the cavity or chamber of the circular ring A, as described and for the purpose set forth.
JOHN TREMPER.

No. 6360.—*Improved Tool for attaching Tubes to Boilers.*

What I claim as my invention and desire to secure by letters patent, is the combination of the guide ring, having mortises therein, with the segmental expanders and conical or pyramidical mandril, constructed and operating substantially as herein described.

Secondly. I claim, as separate and component parts of the same, the double projections on the segments, having a hollow between them, to be placed opposite to the tube sheet while the tube is being expanded within it.

Thirdly. I claim the guide ring and the mortises in the same, together with the projections on the segments to fit into them; I do not, however, confine myself to any specific number of segments, form of projection on the segments to fit into the mortise guide ring, or position of the mortise guide ring itself, which may be placed inside the tube if required; all in the manner and for the purpose substantially as herein before fully described and set forth.
THOMAS PROSSER.

No. 6361.—*Improvement in Brick Presses.*

What I claim as my invention and desire to secure by letters patent, is the mode of compressing the brick and withdrawing the same from the mould, by means of the concave space G, in the eccentric shaft F, and oblong plate E, whose end is inserted in the same, forming a cam motion somewhat similar to a toggle joint, and tangential cogs or ears H, connected together by a bolt or pin *p*, and curved cogs *m*, forming, with the movement above mentioned, a duplex motion, in combination with the radial hand lever *n*, or bar, and foot bar O, by which the operator is enabled to exert the power of his hands and feet, as herein set forth, whether the parts above mentioned be combined with the pistons and other necessary parts, and constructed substantially as those described in the specification, or any others substantially the same, by which analogous results are produced.
NATHANIEL ADAMS.

No. 6362.—*Improvement in Galvanic Batteries.*

What I claim as my invention and desire to secure by letters patent, is constructing the battery with perforated rings or bars, through which are inserted tubular or solid pins, or plates of zinc and copper, or other suitable metals, in the manner and for the purpose herein set forth, for producing voltaic electricity for medicinal and other purposes.
A. D. OLMSTEAD.

No. 6363.—*Improvement in the Divisions between the Tubes of Flexible Boats.*

I do not claim arranging or lashing together a series of inflated cylinders, composed of flexible water proof material, to form a raft or boat; neither do I claim the lashing of such cylinders around the gunwale or sides of a boat to insure buoyancy; nor do I claim forming a boat by stretching water proof cloth or sheets of India rubber over an inflated frame resembling the ribs of such, or any attachment of such substances to a frame for these purposes; but, what I claim as new and of my own invention and desire to secure by letters patent, is making the interior divisions (*b*, *b*, and *c*, *c*,) (which to a certain extent confine the webs or water proof material forming the outer and inner surfaces of the boat,) of some elastic substance, such as sheet India rubber, to allow of the expansion of the air contained in the compartments, whenever the same shall occur from the exposure of the boat to a higher temperature than it was in at the time of its inflation; the whole construction and operation being substantially as described and set forth herein.
EBEN T. STARR.

No. 6364.—*Improvement in Shoulder Braces.*

What I claim as my invention and desire to secure by letters patent, is the back strap A A, attached to the shoulder straps B B, so as to form a continuous band to the posterior loops G G, to which the dress of the wearer is suspended behind, and the connection thereto of the posterior piece H, of the lateral pieces D D, and of the anterior pieces C C, which terminate at the loops J J, the specific action of the whole being that of a suspender combining a spinal and shoulder brace, complete in all its parts, as herein set forth.
HENRY F. BRIGGS.

No. 6365.—*Improvement in Planing Machines.*

Having thus described the construction and operation of my improved planing machine, I wish to make known that I do not claim the employment of one pair of feed rollers, nor the employment of feed rollers, nor stationary planes in themselves, nor a bed composed of alternate friction rollers and flat bars, when the rollers are made yielding by springs or otherwise, as these things have before been used by others; but, what I do claim as of my invention and which I desire to secure by letters patent, is—

First. The combination of the non-elastic mouth piece *w*, with the upper feed rollers H, G, it being attached to the frame in which they are mounted, and by which its position is so governed that it accommodates itself to the surface and thickness of the first shaving cut off the board, substantially in the manner herein set forth.

Second. I claim the combination of the series of stationary planes M, with the bed B, composed of alternate unyielding anti-friction rollers *o*, and flat cross bars *o'*, the axes of the rollers being in the same vertical plane with the edges of the irons, so that their periphery may afford a constant support to one side of the board, directly opposite to the point at which the iron is cutting the other, whereby the surface of the board, especially when it is thin, is rendered smoother and its thickness more uniform than if it were not thus firmly supported.
ENOS G. ALLEN.

No. 6366.—*Improvement in machinery for separating Flour from Bran.*

I do not claim to be the original inventor of an upright bran sifter, but what I do claim as my invention and desire to secure by letters patent, is—

First. The employment of the angular reflecting bars E^2, formed on a portion of the concave surface of the vibrating sifting cylinder E^1, in combination with the radial wings *q*, on the surface of the upper portion of the

close cylinder, when said cylinder is composed in part with the bristle or other brushes, said angular reflectors being thus arranged for the purpose of repeating the reflection of the bran against the radial wings q, of the cylinder, as often as the revolving cylinder throws it against the ribbed portion of the vibrating cylinder or concave, and thus detaching the flour from the bran before it comes in contact with the brushes to be driven through the wire cloth, as above described.

Second. I also claim the employment of the gravitating hammers or beaters V, for the purpose of beating or detaching the flour from the meshes of the wire cloth, in combination with the pistons S, and cam wheel Y, springs K, and reticulated cylinder E, whether arranged in the manner described, or in any other mode, which is substantially the same, the vibrating or flexible cylinder being arranged on the springs K, so as to yield to the stroke of the gravitating hammers, and thereby facilitating the discharge of the flour from the meshes of the wire cloth screen, as described.

JOSEPH JOHNSTON.

No. 6367.—*Arrangement of Flues in Marine Boilers.*

Having thus fully described my improvements, what I claim therein as new, and for which I desire to secure letters patent, is constructing the boiler substantially in the manner above described, by the employment of a series of central and side water tables, forming a flue in which the gases are alternately divided and commingled in the manner and for the purpose set forth.

R. F. LOPER.

No. 6368.—*Improvement in Water Rams.*

Having thus fully described the nature of my improvements in the hydraulic ram, what I claim as my invention, and desire to secure by letters patent, is the conducting the water from the spring or fountain head to the ram, through a cluster of small tubes (*e e*,) combined with the pipe A, that forms the body of the ram, substantially in the manner and for the purpose set forth.

JOSHUA L. GATCHEL.

No. 6369.—*Improvement in Spectacle Glasses.*

What we claim as our invention, and desire to secure by letters patent, is constructing glasses for spectacles in such a manner that the upper portion of each glass is adapted to seeing distant objects, and the lower portion to seeing objects near the eye, the two portions being in one piece, substantially as above set forth.

DAVID HOTCHKISS.
BENJAMIN W. NORTON.

No. 6370.—*Improvement in Cutters for Tongueing and Grooving.*

I do not claim the forming of cutters by turning the reverse section of the work, on the periphery of rings or segments of rings, nor do I claim the mere arrangement of a series of cutters in the same cutter head, these methods being already known; but what I do claim as my invention and desire to secure by letters patent, is making revolving cutters in the form of segments of circular rings, of less diameter than the cutter heads, and arranging and securing them in circular grooves, which at the parts where the cutting edges project, are tangential, or nearly so, to the circles described by the edges of the cutters, in such manner that slight inaccuracies in adjustment will make no

perceptible difference in the operation of the cutters, and whereby the great loss of time and expenditure of labor now usually employed in adjusting revolving cutters for similar purposes are avoided, substantially as herein set forth.

HAZARD KNOWLES.

No. 6371.—*Improvement in Machinery for Breaking and Dressing Hemp.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the rotating beaters, in combination with the arrangement of the two breaking rollers which reverse the hemp or flax, that both sides may be acted on in succession, and which constitute moving rests, to sustain and move the hemp or flax while acted upon by the rotating beaters, substantially as described.

ALLEN ELDRED.

No. 6372.—*Improvement which consists in producing a Substitute for Wool from Jute.*

Having thus fully described the nature of said De Villeneuve's invention or discovery, what is claimed therein, and desired to be secured by letters patent to William O'Connor, administrator, &c., is the producing of a material which may be substituted for animal wool, by taking that species of hemp called jute or Calcutta hemp, and reducing it into fine fibres, capable of being spun into yarn or thread of various degrees of fineness, by stamping, combing, and otherwise treating it, substantially in the manner herein set forth. It is not sought to claim either of the individual processes herein described as of said De Villeneuve's invention, but it is sought to claim him to have produced by their combined operation, from a material hitherto of little value, a fibrous substance of great utility, and not hitherto known in the arts.

WILLIAM O'CONNOR.
Administrator to Estate, &c., of late Henri Meneau De Villeneuve.

No. 6373.—*Improvement in Tanning by Electricity.*

What I claim as new and of my own invention, discovery or improvement, and desire to secure by letters patent, is the application of a circulation of the electric fluid, supplied from any competent source of electricity, to accelerate the process of liming and cleaning hides and skins, and also the application of a like circulation of the electric fluid to accelerate the process of tanning hides of any description, with any proper tanning material or materials in solution, wholly irrespective of the description of hides or skins, and irrespective of the tanning substances employed, substantially as herein described and shown.

EPIDAURUS IRVING.

No. 6374.—*Improvements in Machinery for boring Bobbins.*

I do not claim any of the parts of this machine, except in their application to said machine; but what I do claim as new and of my invention, and desire to secure by letters patent, is first, the combination and arrangement of the cam wheel *j*, hinged vibratory board *h*, connecting arms *g g*, carriage *e*, and cord *l*, weight *k*, notched bar *u*, trigger *w*, and stop A, for imparting to the spool to be bored, a horizontal reciprocatory motion to and from the boring instrument, and for arresting the motion of the carriage at successive intervals, in the manner and for the purpose herein set forth.

CURTIS E. NORRIS.

No. 6375.—*Improvement in Fan Rocking Chairs.*

Having thus fully described my improved attachment, what I claim therein as new and desire to secure by letters patent, is combining with a rocking chair, a curtain suspended upon a frame affixed to the back of the rocking chair and having a weight or weights attached to its lower edge, in the manner and for the purpose above described.

MARY ANN WOODWARD.

No. 6376.—*Removable Fire Box for Locomotives.*

Having thus described the improved arrangement of my boiler and fire-box, I wish it to be understood that I do not claim to be the inventor of the fire-box made separate from the boiler and dome, and afterwards unremovably attached thereto, when set in place to generate steam for motive power; but what I do claim as my invention and improvement, and desire to secure by letters patent, is, attaching an independent fire-box to the steam boiler in such a manner as to render it easily removable, without displacing the boiler dome, machinery, or frame-work, for the purpose of being repaired or replaced by another, whether the means of attachment be those herein described, or others capable of effecting the same object, and which have been used for analogous purposes.

I do not claim making the dome to project from the end of the boiler, over the fire box; but when it does so project, I claim making it with a fixed and tight bottom sufficiently strong to resist the pressure of the steam, in order that it may be unnecessary to rivet it to the fire box, as has heretofore been the practice, and that one or more pipes arranged so as to be easily detached and of sufficient capacity to allow the free passage of the steam generated in the casing of the fire box, may be all the connection that is necessary between the latter and the dome.

JOHN P. DE HAVEN.

No. 6377.—*Improved Forks for holding Rope Belts upon Drum Wheels.*

What I claim and desire to secure by letters patent, is the manner above described of preventing the slipping of ropes upon wheels, viz: by attaching grippers or clamps to the periphery of the wheel, which are made to grasp and hold the rope by its own weight and the draft, the whole operating substantially in the manner and for the purpose set forth.

CHARLES FOSTER.

No. 6378.—*Improvements in Cotton Gins.*

Having thus fully described my improvement in the roller cotton gin, what I claim as my invention and desire to secure by letters patent, is the combination of series of ribs (F S,) and lateral adjustable bearing supports *t t*, with the ginning rollers, substantially in the manner and for the purpose herein set forth.

MALCOM McAULAY.

No. 6379.—*Improvement in Cotton Scrapers.*

What I claim as my invention is the peculiar connection and arrangement of the slide H, landside K, and mould-board No. 1, as described, securing the proper position of the scraper, regulating the position of the stock, and preventing the alteration of its set by the wear from friction to which the unprotected helve is subject.

WILLIAM C. FINNEY.

No. 6380.—*Improvement in Saw Mills, with Cylindrical Saws.*

What I claim as my invention and desire to secure by letters patent, is the forming of the carriage ways of a cylindrical saw mill, with arrangements for laterally inclining their position, with reference to the axis of the saw barrel, for the purpose of preventing the friction of timber against the outside of the barrel, substantially as herein described.

I also claim the moveable dog, sliding on a support in the interior of a saw barrel, in a groove inclined towards the axis thereof, and acting to keep the end of the piece of stuff which has been cut slightly bent as it advances, and out of contact, and consequently free from friction against the interior surface of the barrel, whereby I am enabled to use a saw barrel of increasing thickness from the cutting towards the supporting end of said barrel, in the manner and for the purposes herein set forth.

I also claim the combining of one or more inside with four or more outside cylindrical revolving guides, all capable of sliding longitudinally on their respective axes, so as to accommodate their positions to the gradual wearing away of the saw, and acting to prevent changes in its cylindrical form while undergoing rapid revolution.

GILBERT HATHEWAY.

No. 6381.—*Improvement in Shoe Lasts.*

What I claim as my invention and desire to secure by letters patent, is the employment of the extra screw No. 1, for expanding the uppers over the ball of the foot, in the manner and for the purpose herein described and represented.

JOHN WHISTLER.

No. 6382.—*Improvement in Corn Shellers.*

What I claim as my invention and desire to secure by letters patent, is the combination of the adjustable toothed shelling plates (*m*,) with the fixed bars or segments (*i*,) to form a toothed concave, within which a spiked, fluted or roughened cylinder revolves, for the purpose of shelling corn, the whole being arranged and operated in the manner herein set forth.

ISRAEL KEPLER.

No. 6383.—*Improvement in Machines for Polishing Stone.*

Having thus fully described the nature, operation and construction of my self-shifting stone rubbing machine, what I claim therein as new and desire to secure by letters patent, is the combination of a fixed bed and toothed wheel with a rotating frame, constructed and arranged as herein described, so that the pinions driving the rubber carriages radially therein, shall cause them to pass over a different track with regard to themselves and each other consecutively, the teeth on the fixed wheel not being a multiple of the teeth on any one of the pinions, whether the pinions are of equal or unequal diameter the one to the other.

GEORGE FLETCHER, Sr.

No. 6384.—*Filtering Apparatus for Steamboat Boilers.*

What I claim as my invention and desire to secure by letters patent, is placing a boiler filter near or upon the bottom of a vessel, with a pump elevating the water from its upper surface, when the reservoir beneath the filter is connected with the outside water by means of two inclined apertures, with stops or valves for closing them, constructed substantially as herein described,

whereby the greatest amount of pressure may be exerted upon the filtering diaphragm, and it may be washed by a current produced by the motion of the boat, substantially as herein described. P. K. HUBBS.

No. 6385.—*Improvement in Obstetrical Supporters.*

Now what we claim as our invention, and desire to secure by letters patent, is the combination and arrangement as described, of the pads, straps and handles which make up the above described instrument denominated an obstetrical supporter, whether the said instrument be constructed in the manner above described, or in any other mode substantially the same, by which analogous results shall be produced, as set forth.

ABIATHAR POLLARD.
SIMEON MINKLER.

No. 6386.—*Improvement in Bedsteads.*

I lay no claim to a combination of rest bars or boards, spiral or wound wire springs, a sacking and enclosing frame used to support a cushion or mattress, such a combination having been employed in the manufacture of sofas and various other articles of furniture; but what I do claim as my invention, is the above described manner in which I construct the foundation or support of the mattress or bed, for the purpose of making the bedstead portable and easily set up or put together, or taken apart, as circumstances may require; that is to say, I claim the combination of the two frames or halves of a box, (each of said frames consisting of a side, two ends, and bottom or slats) the two sackings (each affixed to its frame at one side and two ends, and supported on springs or stuffing, as occasion may require,) the clamps and keys or wedges (for connecting the two frames) and the lacing holes, and lacing extending *through the middle* of the mattress foundation, meaning in the above to lay no claim to either of the elements of said combination, when separated from the rest, but intending only to claim the whole as a combination constituting a bedstead support, for a mattress or bed, and to which the posts are to be applied, substantially as above specified.

NATHL. COLVER.

No. 6387.—*Improvement in Machinery for Cutting Screws on Rails for Bedsteads.*

What we claim as our invention, and desire to secure by letters patent, is the combination of the simultaneous adjuster and graduater L J J, with the headstocks C C, the semicircular female governors G G, and V, or other formed bitts or cutters, substantially as above described, through the medium of which a *perfect simultaneous* movement of the bitts is produced in adjusting their relative distances as regards the shoulders of the rail, and in cutting the screws, and also a simultaneous and equal adjustment of the headstocks.

WILLIAM F. CONVERSE.
JONATHAN BURDGE.

No. 6388.—*Improvement in Machinery for Spinning Hemp, &c.*

Having thus set forth my improvements, I shall claim as my invention *the permanent clearer* and presser, in combination with the gill, operating substantially in the manner herein described.

WM. C. HIBBARD.

No. 6389.—*Improvement in Churns.*

Having thus described the construction and operation of my improved churn, what I claim as my invention and desire to secure by letters patent, is the method of exposing the cream thoroughly to the action of the atmosphere, and separating the butter therefrom at the same time, as soon as formed, by means of the air tubes and strainer, in combination with the dasher, arranged substantially as herein set forth. SAMUEL HUFF.

No. 6390.—*Improvement in Frame for Musqueto Bars.*

What I claim herein as new, and desire to secure by letters patent, is the arrangement of rods and springs after the manner or principle substantially as herein represented, by which a tester frame or musqueto bar may be either erected or folded out of the way at pleasure.

L. AIMABLE PROSPER JACQUES.

No. 6391.—*Improvements in cutting out Cylinders for Bobbins, &c.*

What I claim is the combination of one or more passages *e*, with the inner part of the cylinder A, and discharging space or spaces between the ribs, in order to admit of the discharge of the chips or borings of the centre bitt, as specified. LEWIS BROWN.

No. 6392.—*Improvement in Planing Machines.*

What we claim as our invention, and desire to secure by letters patent, is the feeding the boards or plank into the machine, and retaining them in a stationary position whilst they are operated upon by the series of planing, tongueing, and grooving cutters in the reciprocating frame, by means of the pressure rollers (A B,) which are so combined with the reciprocating frame, and with suitable retaining clicks and ratchet wheels, that the rollers will be rotated during the backward movement of the reciprocating frame, and retained in a stationary position during the forward movement of the same, substantially as herein set forth. CHARLES H. PECK.

his
COLEMAN + HICKS.
mark.

No. 6393.—*Improvement in Portable Beer Fountains.*

What I claim as my invention, and desire to secure by letters patent, is a portable fountain, in form and arrangement as herein described, that is to say, the combining therewith, a refrigerator and a gas receiver, to prevent explosions, and retain and preserve beer and other fermented and gaseous liquors, in the manner and for the purposes set forth.

DAVID GAY.

No. 6394.—*Improved method of Fastening Railroad Switches.*

What I claim as my invention, and desire to secure by letters patent, is fastening a railroad switch lever into its place, by means of arcs with slots or notches in them, attached to the lower part of the stand, into which slots a bolt drops, which bolt passes through an elongated hole in the lower part of the lever. I also claim locking the said bolt fast to the main lever, substantially in the manner and for the purpose herein described.

FRANCIS G. WOODWARD.

No. 6395.—*Improvement in Boiling Sugar.*

I am aware that pipes or tubes have been passed through the syrup for the purpose of heating the syrup with the *steam*, and that pipes or tubes are used in locomotive boilers as flues to pass the heated air, smoke, &c., through the water in the boiler for the purpose of economizing the heat, and that several boiling pans have been heated by one and the same fire; I therefore claim none of these, as such, as my invention; but what I do claim as my invention and desire to secure by letters patent, is the combination of the boiling pans H H′ H″, of this construction, with the pipes or tubes J J J, passing through the whole length of the series of boiling pans, and with the several dampers *g c b b′ a* & *a′*, to direct, vary and change the direction of the heat, and with the clarifying pans G′ & G′, so set as to be heated by the same fire which heats the boiling pans, and yet so that the heat may be entirely shut from the clarifying pans, or either of them, at pleasure; the whole constructed, arranged, combined, and for the purposes substantially as herein described

KNIGHT REED

No. 6396.—*Improved Variable Power Capstan.*

What I claim as my invention and desire to have secured to me by letters patent, is a capstan constructed as herein above specified, so as to be susceptible of producing a quick and direct action, to overcome a slight resistance, and a slow and more powerful action to overcome a great resistance by merely turning the drum-head round in the opposite directions, while the barrel of the capstan always moves in the same direction, and the same being accomplished without any shipping or unshipping of gears, and by a system of ratchets, pawls and gear wheels, pinions, &c., all arranged so as to turn with the capstan for the direct and quick action; but for the slow and more powerful action, to turn the capstan barrel in the same direction, by reversing the motion of the drum-head; said parts being combined and operating substantially as herein above set forth.

JOSEPH E. ANDREWS.

No. 6397.—*Improvements in Diving Bells.*

What I claim as my invention and desire to secure by letters patent, is —

First. The stationary mode of descent by slides Z, attached to the canopy 21, corresponding in length to the depth of water, and which slides Z, pass through long upright grooves H and H², attached to the scows E, the slides Z, and canopy 21, attached, being forced down together by the rack and pinion I, or other mechanical equivalents, the whole constructed substantially as herein described.

Secondly. The mode of supplying and using the light, by a lamp *t*, secured to the sides of the canopy 21, having a chimney *m*, passing out from the top, and a tube *r*, and stop cock *s*, from the inside, to admit a current of air of sufficient volume to sustain the lamp *t*, with two glasses, one V, of which throws the light inside, and the other * * out; the oil being kept in sufficient quantity in a holder *o*, on the inside suspended under a vacuum, and regulated by a stop cock P.

Thirdly. For the novel mode of communication through a tube 11, reaching to the top of the slides, with the mouth pieces 22, and stop cocks 24, attached.

J. RUTHERFORD WORSTER.

No. 6398.—*Improvement in Machinery for Sawing Wood.*

Having thus described the construction and operation of my improved sawing machine, what I claim therein as new and desire to secure by letters patent, is the combination of the turning arms (*m*,) with the press beam (*g*,) ratchet wheel (*p*,) reaching arm (*r*,) and lever (*s*,) for the purpose of raising, holding and feeding the wood to be sawed, substantially as herein set forth.

JOSEPH M. TOY.

No. 6399.—*Improvement in Machines for making Grind Stones.*

Having thus described my invention and improvement, what I claim therein as new and desire to secure by letters patent, is the combination of the apparatus for regulating the supply of sand and water, with the boring cylinders, whether the several parts be made and arranged as herein described, or in any other substantially the same manner.

COTTON FOSS.

No. 6400.—*Improvement in Bellows.*

What I claim and wish to secure by letters patent, is a double acting vertical bellows, acting on the air by a centre moveable board, forcing it alternately each way through valves, and receiving wind through it at the same time, as herein described, using any combination of moveable boards and arrangement of valves which will produce the desired effect.

WILLIAM T. BARNES.

No. 6401.—*Locomotive with driving Axle above the Boiler.*

What I claim is the above described mode of arranging the boiler, the axle of the driving wheels, and truck frames of the supporting wheels, whereby I am enabled to produce an engine combining great speed and safety.

R. H. EMERSON.

No. 6402.—*Improvement in Tables for Ship's Cabins.*

The principal feature of my invention and that claimed by me, is the above described peculiar arrangement of, or manner of arranging the hinges or rocking or turning bearings of the table top, together with that of applying the pendulum apparatus by which the level of the top board is preserved under the transverse motions of the vessel; the said arrangement consisting—

First. In placing the hinges or turning bearings nearer to that edge of a table at which a person is to sit than to the opposite edge, substantially as shown in the drawings.

Second. In applying the pendulum apparatus to the opposite side or part of the table, essentially as described, whereby it is caused, when the pendulum is vibrated, to act against or raise and depress and give greater motion to that side or part of the table top which is opposite to that at which the person sits; the effect of said arrangement, when a vessel is in the act of rolling, being not only to render the table free from inconvenient motion where a person sits to it, but to impart to it stability under weight or pressure applied to it near the edge at which the person so sits or is placed. And I also claim the above described mode of making a table, viz: a combination of two top boards B, B′, a supporting frame, and one or more sets of pendulum apparatus, whether made and applied as exhibited in figures 1,

2, 3 and 4, or as represented in figure 5, and as above explained; the whole being constructed so as to operate essentially as above specified.

WILLIAM N. BOGGS.

No. 6403.—*Improvement in Calculating Machines.*

What I claim and desire to secure by letters patent, is the combination of the stationary circle A, figure 1, with the circles C and D, figure 1, and with circles O and 6, figure 2, in the manner and for the purpose substantially as described. I also claim the combination of the inner circle C, figure 1, with the ratched circle *b*, figure 2, in such a manner as to move circle 6, figure 2, one number in one direction for every revolution of circle C, in a contrary direction, for the purpose of carrying one to the outer square hole F, for every hundred added by moving circle C. I also claim the combination of the pinion 8, with the moveable circle D, and the roller 9, screw 10, and wheel *y*, and the bevel 7, whereby when the circle D, is moved round, the roller 9, and the minor circle plate of E, are moved also in conjunction with the circle C, for the purposes herein set forth.

I do not claim the particular mechanical devices in this machine, such as a bevel plain to turn a pinion, and a screw to move a wheel, as all these have been long known, but I claim the combination, in the manner specified in the above claims, of the mechanical devices, or their equivalents, herein set forth, along with the circles and circle stationary, and fixed, having figures on the same, to produce the arithmetical results, substantially as herein described.

WILLIAM M. HAINES.

No. 6404.—*Improvement in printing Paper Hangings.*

What we claim as our invention, is the combination of the platens with the block frames, by means of the coiled springs, to keep up the blocks from the face of the table, and to allow the said blocks to be pressed down on the paper and color seives, substantially as described.

We also claim the arrangement of the cams on the revolving shaft, in combination with the spring pistons in the guide eyes *o, o, o*, to press down the platens during the intermission of the motion of the block frames, substantially as described.

We also claim the combination of the catch bars J^1, J^2, with the rocker L, and the connecting rod V, and oscillating angular lever M, and the arm N, connected with the block frame, to take the printed paper from under the block, and bring forward the unprinted paper to receive the next impression, substantially as described.

W. M. SHAW.
EZRA GOULD.

No. 6405.—*Improvement in Trusses.*

What I claim as my invention and desire to secure by letters patent, is the mode of applying a truss or supporter, constructed substantially as herein described; and I also claim making the metallic or spring portion of the truss or supporter, to be applied perpendicularly between the legs of round or oval wire, in the manner and for the purpose herein described.

ABIJAH SMITH.

No. 6406.—*Improvement in Artificial Teeth.*

What I claim as my invention and desire to secure by letters patent, is making or preparing the tooth with an aperture passing through it, and terminating with a counter sink or suitable bearing, to receive or support the head of the screw, as herein set forth, as a new article of manufacture.

HENRY LAURENCE.

No. 6407.—*Improvement in Education Tables.*

Having now described my invention, I will proceed to state what I claim and desire to secure by letters patent—What I claim as my invention, is the manner in which I make my education tables, substantially as set forth, of two sets or series of grooves, one for the fount, the other for the operations of calculation, in combination with sliding types, the grooves and types so constructed as to prevent the types from being lifted or falling out, and the grooves so arranged that the types may pass by each other, as set forth.

EDWIN ALLEN.

No. 6408.—*Self-regulating Filtering Diaphragm.*

What I claim therefore as my invention and desire to secure by letters patent, is the combination of a filtering diaphragm, composed of elastic media and moveable disks, substantially as herein described, when combined with an outer shell or case within which it can rotate, either to force the liquid to pass through the filtering medium, or to pass by the side thereof, and issue without being filtered, the stem or journal of the diaphragm being passed through a stuffing box attached to the outer case, as herein described, or in any other manner essentially the same.

I also claim making the filtering medium with one or both perforated disks, moveable, as herein described, when combined with an elastic filtering medium, substantially as described.

WILLIAM H. JENNISON.

No. 6409.—*Improved Right or Left Hand Lock.*

What we claim as our invention and desire to secure by letters patent, is the constructing a door lock in such a manner as to allow of its being used equally well on a door opening either to the right or to the left hand, by means of a key hole that will admit a key within the lock in reversed positions, in combination with such an arrangement of the movements of the lock as will enable the key to operate the same tumbler and bolt, in whichever position it may be inserted within the key hole.

L. R. LIVINGSTON.
JOHN J. ROGGEN.
CALVIN ADAMS.

No. 6410.—*Improved Gold Washer.*

What I claim as my invention and desire to secure by letters patent, is the employment of a chamber or tube through which a current of water is to flow, when this is combined with a second tube or chamber, which receives the gold and earthy matter, and the third or outer chamber provided with a bottom so far below the partitions forming the first and second tubes or chambers as to leave a space for the passage of water from the first tube or

chamber to the discharge chamber or outer casing, substantially in the manner and for the purpose specified.

L. JENNINGS.

No. 6411. — *Improvement in Churn Dashers.*

Having thus fully described my improved dasher, what I claim therein as new, and for which I desire to secure letters patent, is the above described dasher, made concave, with openings around it for dispersing air throughout the cream without the use of valves, constructed and arranged substantially in the manner set forth.

JOSIAH A. GRIDLEY.

No. 6412. — *Improvement in Machinery for making Mats, &c.*

Having described our invention and the best manner known to us of manufacturing the same, likewise the manner of making the fabric; we do not claim the invention of fabrics whose body and nap are held together by means of cement or glue, as this has been made before, by drawing the threads through openings in plates of metal and wire cloth; nor do we claim the invention of the cylinders nor the graduating screw, nor the hooks used in making our machine; but what we do claim as our invention, and desire to secure by letters patent, is a comb composed of a series of divisions or cells, either entirely separated or otherwise, in combination with the pistons and graduating screws, in manner and for the purpose substantially as is above described.

DANIEL HODGMAN.
A. D. WYCKOFF.

No. 6413. — *Improved method of making wire-strengthened Spoons.*

What I claim as my invention and desire to secure by letters patent, is the mode herein described of making spoons by first casting them upon a draw tap, with the ends of the spoon handles larger than ordinary, and then having inserted a wire, swedging the handles to the required and proper shape, completely covering and concealing the inserted wire.

WILLIAM MIX.

No. 6414. — *Improvement in Valve Seats, &c., for Water Mains.*

Having thus fully described the nature, construction and operation of my invention, I wish it distinctly understood that I do not claim separately, any of the parts involved in this combination; but what I do claim and desire to secure by letters patent, is arranging and combining substantially as described and represented, or in any analogous manner, the several parts involved in the construction of stop valves for water mains, viz: the chamber (*a*,) the moveable pipe heads (*b*,) the valve seats (*c*,) the system of lugs, bolts and screw nuts (*g*,) the soft metal (*z*,) and the valve (*d*,) so that buried as they must be, beneath the frost line in the ground, they can be adjusted in the matter of their valves and valve seats, without being removed from their permanent location in the line of the water main.

T. R. SCOWDEN.

No. 6415. — *Improvement in Cast Iron Car Wheels.*

What I claim as my invention, and desire to secure by letters patent, is casting railroad car wheels with a rim C, of the form of a semi-elipsis, and of an oblate spheroid B, near the centre, the hub A, being cast solid with the

same, with braces D, of the form of cyma-reversa, and cyma-rectas formed in the valley between the rim and oblate spheroidal shell surrounding the hub, arranged in contrary directions on either side, in the manner and for the purpose herein set forth.

ISAAC VANKURAN.

No. 6416. — *Improvement in Easy Chairs.*

Having now described my improvement in making easy chairs for the sick room, I will proceed to state what I claim and desire to secure by letters patent. What I claim therefore, is the employment of the sliding seat board D, draw slide F, for covering the mouth of the chamber box, and the sliding chamber box H in combination with, and as adapted to an "easy, or sick room chair," so as to make a portable close chambered easy chair for the sick room, in form and manner substantially as herein described.

AUGUSTUS CLARKE.

No. 6417. — *Improved method of turning the Drill in Rock Drilling Machines.*

We claim the combination of the slotted plate, and the friction clasp and its arm, as applied to the drill shaft and main frame, and made to operate in connection with the elevating jaws *c c*, substantially in the manner and for the purpose of rotating the drill, as specified.

JESSE N. BOLLES.
HENRY G. KNIGHTS.

No. 6418. — *Improvement in the preparation of Flour for Bread Making.*

I do not claim mixing acid and alkali with flour, as a substitute for yeast, nor do I claim mixing one of these ingredients with flour in the dry state, when the other is dissolved for making bread; but what I do claim, is mixing both the acid and alkali with the flour in the dry state, sugar and salt being added or not, at will, substantially in the manner and for the purpose herein set forth, as a new article of manufacture.

HENRY JONES.

No. 6419. — *Improvements for Jointing and Cutting Staves.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the main (stave cutting) knife C, with the two jointing knives, and with feeding apparatus, in such a manner that the staves will be jointed immediately before they are cut from the block, and then the block moved forward in the proper position, to be again acted upon by the jointing and stave cutting knives, substantially in the manner herein set forth.

CHARLES MOWRY.

No. 6420. — *Improvement in Electric Telegraphs.*

What I claim as of my own invention and improvement, and desire to secure by letters patent, is—

First. The use of a *single circuit* of conductors for the marking of my telegraphic signs, already patented for numerals, letters, words or sentences, by means of the decomposing, coloring or bleaching effects of electricity acting upon any known salts, that leave a mark as the result of the said decomposition, upon paper, cloth, metals or other convenient and known markable material.

Second. I also claim the combination of machinery as herein substantially described, by which any two metallic points or other known conducting substance, broken parts of an electric or galvanic circuit, having the chemically prepared material in contact with and between them, may be used for the purpose of marking my telegraphic characters already patented in letters patent, dated 20th June, 1840, in the first re-issue 15th January, 1846, and second re-issue 13th June, 1848. SAMUEL F. B. MORSE.

No. 6421.—*Improvement in Corn Shellers.*

Having thus fully shown and specifically described the nature and kind of our several improvements in the construction of the machine for shelling corn, and fully and specifically described the several operations of the said several improvements; now what we claim therein as new and desire to secure by letters patent, are—

First. The manner in which we cut out, and bevel off, the spaces between the teeth of the driving wheel and pinion, as represented in figs. 1, 2 and 6, at the points *a a a*, so as to present a sharp edge instead of a plane surface or bed between the teeth.

Second. We claim the combination of the toothed wheel seen in fig. 1, with the bevelled or curved cylinder seen in fig. 3, arranged in the manner and for the purpose described; which said improvements being so made are to operate in the manner and for the purposes herein before more fully and specifically set forth. We do not claim any other part of the within described machine or apparatus as our invention.

EZRA WHITMAN.
DAVID O. PROUTY.

No. 6422.—*Improvement in Sausage Machines.*

What I claim in the foregoing as my invention and desire to secure by letters patent, is the nozzle for stuffing the sausages, in combination with the hollow and solid conoids for grinding or mincing the meat, whether the same are arranged as herein described, or in any other substantially similar manner, by which the processes of stuffing and grinding can be simultaneously performed at one operation. THOMAS LOCKETT.

No. 6423.—*Improvement in Broom Brushes.*

What I claim as my improvement and discovery and desire to secure by letters patent, is the application and adaptation of the branches of the cabbage palmetto tree to the manufacture of brooms and brushes, (the handles being a portion of the same,) as described.

AGDALENA S. GOODMAN.

No. 6424.—*Improvement in Spring Rake Teeth.*

I lay no claim to the mode of applying each of the teeth to the beam or head of a rake, viz: by the joint, spring and staple, in combination with each other and acting together, as specified in the patent of Seneca Ladd; but what I do claim as my invention, is my improved mode of applying each tooth to the rake-head; that is, I claim the combination of the spring *socket*, spring and tooth, as arranged, constructed and applied together and to the rake-head, substantially as specified. LYMAN BAKER.

No. 6425.—*Improvement in Trusses.*

What I claim as my invention and desire to secure by letters patent, is two rods of metal of a proper size and shape, figure 1, letters *a*, *b*, and meeting under the pereneum, when in use, in combination with the metallic spiral spring or springs, or other analogous device.

LEWIS A. HALL, Physician.

No. 6426.—*Improvement in Washing Machines.*

Having thus described the construction of our improved washing machine, and the manner in which it operates, what we claim therein as new and desire to secure by letters patent, is—

First. The combination of the lever H, alternating rod *f*, and jointed rods *i*, with the dashers and wash boxes *b* & *c*, whereby two different lots of clothes, in two distinct wash boxes, may be cleansed at the same time by the action of two separate dashers operated by one lever.

Second. We claim the combination of the wells and plungers with the wash boxes, substantially in the manner and for the purpose described.

SYLVESTER MUNSON.
WM. H. PRATT.

No. 6427.—*Improved Self-acting Railroad Switch.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of the traversing bar or lever D, horizontal connecting rods E, oblong plates *h c*, containing straight and oblique slots *g d*, in which the pin or cog F, rising from the connecting rod E′, next the main track moves; transverse curved bar *b*, secured to the oblong plate *c*, containing the oblique slot, and to the vibrating ends of the switch, vibrating plates *f*, having cogs H′, projecting from the upper parts, levers G, and springs H, and horizontal bar I, on the locomotive, operated as before stated, for moving the ends of the switch either next the end of the rails of the main track, or turn out track, at the option of the engineer, or other person to whom the duty is assigned, substantially as herein set forth.

LUCIUS B. WOODS.

No. 6428.—*Improved Lugs and Links for connecting Pipes.*

I do not claim as my invention the horns or lugs, and links or hasps, simply to hold the ends of the pipe together, as they have been used before; but I claim the hooked form of the horns B B, and the wedgelike form of the horns C C, by which the links or hasps D, when applied to the said horns are made to perform in a speedy and cheap way the work of screw bolts in making a tight joint, substantially as above described. For this I desire letters patent. CHAPMAN WARNER.

No. 6429.—*Method of operating Railway Switches.*

What I claim as my invention and desire to secure by letters patent, is the arrangement and combination of the notched lever D G, slotted sliding plates F, blocks or keys (*d*,) attached to the levers G, by the pins H, and chains I J, pulleys (*e f*,) and weights *g*, operated by a cam or projection on the under part of the locomotive, in the manner and for the purpose herein set forth.

W. C. HICKS.

No. 6430.—*Improvement in Brewing and Preserving Alcoholic Drinks.*

What I claim as my discovery and desire to secure by letters patent, is the preparation and employment of oak or other woods possessing similar chemical properties, or an extract of such woods, substantially as herein described, as a substitute for hops in brewing, distilling and yeast making, to refine and improve the flavor of spirituous liquors, as a counteractive of acetous fermentation generally in wines and other fermented liquors, in syrups, vegetable extracts and other unfermented liquids, and to correct and improve the flavor of stale wines, cider or beer. JOHN HOPKINS.

No. 6431.—*Improvement in Daguerreotype Apparatus for Gilding Plates.*

We do not claim to have invented any of the parts used herein, as all are well known; but what we do claim as new, and of our own invention, and desire to secure by letters patent of the United States, is the application of the frame *c*, constructed with points 8 and 9, to carry the plate supported by a moveable standard *a*, on a triangular bed *a*, having screws 1 1, for the purpose of adjusting the frame *c*, and daguerreotype plate to a level, while "gilding" or otherwise operating on the same, substantially as described and shown.

WILLIAM LEWIS.
W. H. LEWIS.

No. 6432.—*Improvement in Saw Mills.*

What I claim as my invention and desire to secure by letters patent, is the means above described, to preserve, increase and regulate the tension of the working portion of the saw, when at work, viz: the application of the driving power to the lower pulley *b*, when the saw is designed to work in its downward motion, and the application of the break *z*, to the upper pulley *a*.

LEMUEL HEDGE.

No. 6433.—*Improvement in Bedsteads for Invalids and others.*

What I claim as my invention, and desire to secure by letters patent, is first, the setting of the posts B, in such a manner as to admit of the swinging of the suspended frame K, either lengthwise or crosswise of the bed.

Second. I claim guide board *m m m m*, worked by straps or otherwise, for giving direction to the motion of the suspended frame.

Third. I claim the application of the springs to support the guide boards in their places during the operation of swinging.

FRANCIS M. WEBSTER.

No. 6434.—*Improvement in Destroying Weevil in Grain.*

I do not claim the use of heat separately, in the destruction of the weevil, as my invention, when the same is not combined with concussion of the grain infested with this insect, nor do I claim as new, the construction of a heater of any other than a prismatic form, with wide sides, having oblique adjustable cells therein.

But what I do claim as my invention, and desire to secure by letters patent, is the application of the combined action of heat and concussion to grain and other seeds, for the destruction of weevil and other insects, and the eggs and larva thereof, infesting the same, and separating other foreign matter therefrom, by means of a hollow prism, heated from its interior, and turning in a trough, the prism being surrounded by adjustable cells attached obliquely

across its sides, the whole being arranged and operated substantially in the manner and for the purposes herein set forth.

WM. WATSON.

No. 6435.—*Improvement in Apparatus for Spooling Yarn.*

What I claim as my invention, is the arrangement or arranging of the point or nose of the spindle within a short distance (say about one inch, or a half inch, or nearer if possible) from the yarn guide which is directly over it, and (that is in combination with) so applying the spindle to its supporting rail by means of a hinge slide or other equivalent, that it either may be inclined or turned down out of a vertical position, or be moved or slid outwards to such extent as to permit a cop to be placed on it without interference with either the guide rail or the yarn guide.

I also claim the arrangement of the friction fetter with respect to the yarn guide, in combination with the so supporting it on the guide rail by such a contrivance, viz: a hinged arm or slide, or its equivalent, as will admit of said fetter being moved away from the guide sufficiently for the purpose herein before stated, the said arrangement of the fetter with respect to the guide, consisting in placing it directly in front of, and partially below the guide, as above described, and as exhibited in the drawings.

GEORGE H. DODGE.

No. 6436.—*Improvement in Machinery for working Lumber into Irregular Forms.*

Having thus described the construction and operation of my improved apparatus for dressing irregular forms in wood, what I claim therein as new and desire to secure by letters patent, is the combination of the clamp tongs I, wedge J, rock shaft K, lever L, and inclined planes *m m*, with the carriage, substantially as herein described, for the purpose of holding and firmly supporting slender pieces while being subjected to the action of the cutters, but releasing them while their position is being changed.

RUFUS POWERS.

No. 6437.—*Improvement in Sewing Machines.*

Having thus described my improved sewing machine, what I claim therein as new, and of my invention, is as follows:—

I claim the stationary point *u*, (or any equivalent contrivance for supporting one end of the cloth) and moveable or adjustable clamping slider and point *w*, in combination with the line or series of points or wires *r r r*, &c., the whole being arranged and applied together, substantially in the manner and for the purpose as above specified.

JOTHAM S. CONANT.

No. 6438.—*Improved method of constructing and operating the Header in Bolt Machines.*

I claim the above described improvement in the heading machinery, or in other words, I do not claim a single header, operating by one or more blows or movements towards the gripping or holding dies; but that which I do claim as my invention, is the double header, constructed with an upsetting hollow frustum recess *a*, and a plane or projecting plane face, surface or die *b*, and

made to operate with respect to the gripping dies, substantially in manner as herein before specified; that is to say, by the action of the recess frustum die to first form a frustum on the end of the rod, and next by the action of the plane die b, to upset the same into the head space of the gripping dies, and thereby give to the head the form required, the sunken or recessed die having in the meantime been depressed in such manner as to bring the flat die b, into the proper position for the completion of the head.

D. L. WEATHERHEAD.

No. 6439.—*Improvement in Sewing Machines.*

I do not intend to confine my invention to the use of an endless belt alone, as a revolving circular table or a cylinder may be substituted therefor, the points being inserted in or made to project from the curved surface of either of them.

What I claim as my invention or improvement, in the sewing machine, is the combination with the endless cloth holder of the curved bar or piece of metal v, for discharging the cloth from its points after being sewed, all as described.

JOHN BACHELDER.

No. 6440.—*Improvement in preparing Metallic Patterns for Castings.*

What I claim in the before described process as of my invention and desire to secure by letters patent, is converting the surface of iron castings into plumbago, by treating them with dilute acid, and then reducing them to the required form and size, and smoothing and polishing them, substantially in the manner and for the purpose herein set forth.

THEODORE G. BUCKLIN.

No. 6441.—*Improvements in machinery for laying Ropes.*

What I claim therefore as my invention, is a combination consisting of the guard, its rope and weight, and the lever shaft f^2, with its arms, spring, shifting lever and catch, the whole being applied to the spindle C, essentially in manner and for the purpose specified.

I also claim the combination with the lever shaft f^2, having arms o^4, r^2, spring catch and shifting lever, as described, or any other suitable mechanical equivalent for shifting the driving belt from the fast to the loose pulley, the slide bar h^3, the spring lever i^3, having an arm m^3, and the pins g^3, inserted in the flyer head I, the said combination being for the purpose of arresting the motion of the machine on the breaking of a strand.

MARTIN GUILD.

No. 6442.—*Improvement in Annunciators for Railway Carriages.*

What I claim is as follows:

First. The combination above described to be operated by a movement of the trigger lever, by the conductor or any other person of the train, the said combination consisting—1st. Of the dial plate or disc, and its tubular shaft; 2d. Of the index hand and its shaft, the same having a ratchet wheel and retaining pawl or not, as circumstances may require; 3d. The notched wheel affixed to the dial plate shaft; 4th. The pawl of said notched plate; 5th. The main spring—the said main spring being so connected to the index and dial plate shafts as to cause the dial to operate or turn around in

one direction and indicate the stations, the whole being substantially as described.

Second. I claim, in combination with the mechanism above claimed, the mechanism for reversing the motion of the dial plate, the same consisting of gear wheels O, K, those fixed on the shaft n', and said shaft, the tri-armed lever p, q, r, and pinion t, the whole being applied together, and to the mechanism before claimed, and made to operate essentially as above specified.

Third. I claim, in combination with the mechanism herein first claimed, the mechanism which retards the rotary movement of the dial plate, and serves as an additional stop motion, the same consisting of the axle W, gears X, O, and Y, shaft z, pinion b, catch wheel and dog, the whole being made to operate and serve the purposes above mentioned.

Fourth. I claim, in combination with the mechanism herein before first claimed, the alarm apparatus, the same consisting of the gear wheel O, shaft g, pinion h, escapement wheel i, escapement k, pendulous hammer and bell, the whole being combined and made to operate essentially as described.

Fifth. In order to make the apparatus a self-operating or automatic machine, I claim a combination made up of the following elements or their mechanical equivalents, viz: 1st. One or more cams or inclined planes applied to the railway track; 2d. One or more legs b', c', affixed to a shaft connected with the car, also a cord or other contrivance so connected with the trigger lever and the shaft of the car as to be operated as described, when the leg passes up the inclined plane; 3d. The mechanism covered by the claim herein before first made, or any mechanism constructed and made o operate essentially like the same.

MASON H. FORD.

No. 6443.—*Improvement in machinery for dressing Staves.*

What I claim as new and desire to secure by letters patent, is the vibrating feeder bar M, in combination with the carriage frame O, which permits either the elevation or the depression of the rear end of the stave, when passing under the weighted levers L, L, as herein set forth.

Second. I also claim, in combination, the pressure levers L, L, acting independently of each other, but each in connection with a weighted lever, (L', L',) with the elevated plane support (N,) with convex and concave revolving cutters (p and p',) with the adjustable bevel edged plate (G,) and curved support (N',) forming a throat, whereby a stave, while being pushed forward, substantially as described, and undergoing the process of dressing, is held in positions constantly adapted to the various thicknesses, crooks and windings of the timbers, without liability, to be cut across the grain, substantially as herein set forth.

Third. I also claim in combination the ratchet bar (B,) the lever (E,) tumbling shaft (F,) supporting hand (H,) weighted lever (J,) with the trigger or bent lever (I,) the pawls (K K K,) the tripping bar (P,) and disengaging check Q, on the carrying frame (O,) arranged and acting temporarily to sustain the stave while its rear end remains between the cutters ($p\,p'$,) and after it has passed from under the weighted pressure levers L L, whereby the under thinning away of the stave near the end is prevented in the manner herein set forth.

Fourth. I also claim the auxiliary saw carriage (F′,) in combination with a moveable curved roller (B″,) and springs S″ & S‴, for regulating the breadth of the jointed stave to that of the bolt, as ascertained by gauging and adapting the amount of bevelling to the breadth, whereby staves of unequal breadths may be so jointed as to be used in setting up the same cask, as herein set forth.

Fifth. I also claim the combination of the reversed curved ways *t t*, and the endless chain working over angular or toothed rollers, with the swivel jointed dogs K K K, arranged and acting to receive the dressed stave and carry it forward, first in contact with one saw jointer and then with the other, whereby I am enabled to joint successively both edges of the stave before it leaves the machine, and avoid handling the staves after the jointing has been commenced, substantially as herein set forth; but I do not claim or use the manner of making an endless chain rim in a curve for that purpose.

Sixth. I also claim the manner of arranging the adjustable jointing saw (*c*″,) curved roller (B″,) and supporting springs (S″,) projection O′, and spring bars *c*‴, whereby the true jointing of straight, crooked or twisted staves is effected, the roller constituting with the springs a throat through which the dressed stave is made to pass in contact with the jointing saw, thereby enabling the bevel in every part of the length to correspond to the cross section of the stave, substantially as herein set forth; not intending in these claims to limit myself to the exact arrangements described, but to vary the same at pleasure, while I accomplish the same ends by means substantially the same.

HERVEY LAW.

No. 6444.—*Improvement in Machinery for cutting Soles of Boots and Shoes.*

What I claim as my invention is as follows: that is to say, I claim the combination of the four frames B B′, E E′, and the moving toe knife frame, for receiving and holding the shaping blocks of the cutting knives, the said frames being connected and operated by screws in manner and for the purpose as above specified.

I also claim the combination of two sets *p q*, and *r s*, or *p′ q′ r′ s′*, of holding and shaping blocks operated as above specified, and whether used on either or both sides of the machine, and for the purpose of sharpening the knife *w*², so as to cut a right or left sole, of what are termed "*rights and lefts*," all as above set forth.

ABRAM D. BOYNTON.

No. 6445.—*Improvement in Tarring Rope Yarns.*

I lay no claim to the process of tarring yarns, as it is ordinarily conducted, viz: that wherein the tar is first either heated or boiled, and while so heated or boiled the yarns are passed through it, they being at their entrance into the tar at the temperature of the surrounding atmosphere; but what I do claim as my invention, is my improvement on the said process; the said improvement consisting in heating the yarns previous to their immersion in or passage through the tar, and using the tar either at the temperature of the atmosphere surrounding it, or at a temperature of blood heat or thereabouts, and not one which shall materially volatilize or evaporate its essential oil or spirit, in comparison with the evaporating of the same, which takes place under the old process above described.

WILLIAM MONTGOMERY.

No. 6446.—*Improvement in the Combustion of Fuel.*

I do not intend to claim as my invention any particular form of steam boiler, reverberatory furnace, or water or air heating system of tubes, and I would have it understood that I do not confine myself to the details herein described so long as the peculiar character of my invention be retained; nor do I claim the mere admission of air, heated or cold, above the fire bars, as I am aware that this has already been done; but what I do claim, is the mode of constructing furnaces whereby numerous streams of air are caused to pass above the fire bars, through perforated fire brick, lump or suitable stone at the sides and front of such furnaces, in combination with the arrangement for making the products of combustion pass through and beyond reticulate partitions of the same materials, before they come in contact with the surfaces or objects intended to be heated, in the manner and for the purposes substantially as herein set forth.

RICHARD COAD.

No. 6447.—*Improvement in Machines for cutting and slitting Cheese Hoops, &c.*

Having thus described my invention, I claim the knife stock F, attached to the moveable frame in such a manner as to swing up the knife I, for the purpose of sharpening the same either by attaching the stock to the frame by hinges above and a clasp below, or for such equivalents as will make the knife stock moveable, in the manner and for the purpose set forth.

I also claim the combination of the moveable face plate E, with the slide or stock J, in such a manner that the position of the face plate can be changed during the operation of the machine, for the purpose of counteracting the effects produced by the springing of the knife I, in passing through the central and hardest portion of a piece of wood, and thereby enabling the operator to perfectly govern the thickness of the veneers or splints cut from different parts of the same piece of wood without stopping the machine.

I also claim the combination of the pointed slitters Q², with the slide or stock J, in such a manner that they (the pointed slitters) can, while the machine is in motion, be thrown into use to act in combination with the knife I, when their services are required, and be thrown out of use again without stopping the machine, when their services are no longer needed, substantially as herein set forth.

PATRICK BRYANT.

No. 6448. — *Improvement in the Cut-off and Steam-stop of Rotary Engines.*

What I claim as my invention and desire to secure by letters patent, is the cut-off valves V, V, constructed with apertures through them, and fastened to the steam-stops, acting in the manner and for the purpose herein described.

I also claim the combination of the cut-off valve and of the curved apertures *w*, with the arc and radius steam-stops, arranged in the manner and for the purpose set forth.

JOSEPH W. WEBB.

No. 6449.—*Improvement in Chimney Caps.*

I am aware that many plans for producing similar effects have been essayed, and some are patented and in use, one of which seeks to provide

for these objects by making the shaft conical, with outer frusta, of *direct* cones, so fitted that the action of the exterior current is nearly or entirely lateral or horizontal within and across the shaft or flue; but I do not know of any other arrangement for these purposes in which, by the application of direct and *inverted* conical or pyramidal frusta, the exterior current, as it strikes the cones and enters the shaft, is forced to travel in nearly direct vertical lines, until it arrives at the final exit, on the leward side of the apparatus; therefore, I claim as new and of my own invention and desire to secure by letters patent of the United States, the application of the obtuse frustum 2, having holes 3, opening under the frustum *b*, to admit the exterior current of air into the truncated continuation 4, of the shaft *a*, when such application is in combination with the *inverted* frustum *c*, above and detached from but surrounding the part 4, to pass the exterior current under the cap *d*, the whole combined and operating substantially as described and shown.

CHARLES K. SCUDDER.

No. 6450.—*Improvement in Harvesters.*

Having thus described the construction and operation of our improved harvesting machine, what we claim therein as new and desire to secure by letters patent, is giving to a vibrating blade a compound transverse and horizontal stroke or cut, by combining it with jointed vibrating levers, (*m*,) or other similar device, capable of producing the same movement, when the same is combined with stationary teeth, (*h*,) or a reel, (*b*,) substantially in the manner and for the purpose herein set forth.

JAMES L. FOUNTAIN.
HENRY K. FOUNTAIN.

No. 6451.—*Improvement in Bedstead Fastenings.*

Having thus fully described my invention, what I claim therein and desire to secure by letters patent, is fastening the post of a bedstead to the rail, (or the rail to the post,) by means of a hook, wedge shaped from point to butt, next its attachment, and a groove having a catch pin therein, which groove is concentric with the axis of the joint, substantially as described and set forth, whether placed at one or another point of the sweep of its circle, the hook being correspondingly attached.

JAMES BROOKE.

No. 6452.—*Improvement in Grain Separators.*

What I claim as my invention and desire to secure by letters patent, is the construction and use of a fly or paddle marked G, to carry the grain and chaff from carrier P, to carrier O.

HOMER SMITH.

No. 6453.—*Improved Lock for Fire Arms.*

I *do not* claim the invention of a sear, nor the hanging together of the hammer and trigger, (or cocking lever,) but that which I *do claim* and desire to secure by letters patent, is the combination of the *sear* "*a*," the *set* or *tumbler* "*b*," and the *set* or *tumbler screw* "*c*," or its equivalent, whether the

Second. Giving the twelve musical intervals distinct names, so that the use of the words flat and sharp is entirely avoided, and with them all the confusion naturally arising in the mind of a beginner.

Third. Representing the sounds usually called natural by one uniform color, and those commonly called flats and sharps by another uniform color, so that they may be distinguished from each other by a mere inspection of the musical character representing the note, without the use of chromatic signatures.

ERNEST VON HEERINGEN.

No. 6529.—*Improvement in Inhalers or Lung Protectors.*

What I claim as my invention and desire to secure by letters patent, is—

First. I claim the nose or mouth joint having the piece I, made to fit the nostrils or the mouth, in combination with the valves A and B, for the purpose of causing the air to enter and be discharged through separate orifices, as herein described.

Second. In combination with the said nose or mouth joint and valves, I claim the filterer D, either with or without the tube E, as described.

LEWIS PHECTIC HASLETT.

No. 6530.—*Improvement in Cooking Stoves.*

I wish it to be distinctly understood that I do not limit myself to the application of this method of lining and protecting plates to the shifting plates used in the tops of stoves, but that the same may be applied to the tops of stoves when made in any other way.

What I claim as my invention and desire to secure by letters patent, is the method, substantially as described, of equalizing the heat in the oven by combining with the diving flue at the back and the series of tubular flues at the bottom, with spaces between them, the return flue below the flue tubes, and the return flue at the back of the diving flue, substantially as described.

And I also claim the method of protecting the top plate of the stove or the parts thereof, by lining it or them with a perforated plate or plates, with some earthy cement or other refractory substance interposed between the plate or plates and the perforated lining, as described.

JORDAN L. MOTT.

No. 6531.—*Improvement in Reed Musical Instruments.*

What we claim as our invention and desire to secure by letters patent, is the converting the wind chest (B,) in which the reeds *m*, are located into an expansible sounding chamber by forming one side of it (the said wind chest) of a thin elastic sounding board (*c*,) placed in sufficiently near proximity to the reeds—when this arrangement is combined with the location of the valves on the outside of the wind chest or sounding chamber, substantially in the manner and for the purpose herein set forth.

B. T. BLODGET.
H. B. HORTON.

No. 6532.—*Improvement in Washing Machines.*

I do not limit myself to the materials, dimensions nor proportions set forth in these specifications and drawings of the machine in its various parts, but claim as my invention and desire to secure by letters patent, the combination

No. 6458.—*Improvements in Boring and Mortising Machines.*

What I claim as my invention and desire to secure by letters patent, is the combination of an auger and two chisels, with the several parts which regulate their operation for the purpose of boring and mortising hubs, as the method by which the auger is brought to use through the auger gate X, fig. 2, the stands *n n m*, and *k*, with the arrangement of the pulleys Z Y N, and M, the operation and government of two chisels through the use of fenders B B, long cog on chisel stock (see 6 fig. 9,) slides C C, and spring catch 8, fig. 7, wedges E E, and rag-iron 7, fig. 7, rods and springs O O, stoppers F F, and springs which throw the fenders apart laterally, the combination being more particularly described in the foregoing specifications.

CHANDLER CARTER.

No. 6459.—*Improvement in Bench Planes.*

We claim constructing and applying the bitt or cutter, substantially as described, that its lower surface may constitute that part of the surface of the plane back of the cutting edge, in combination with the hollow stock for the passage and delivery of shavings, substantially as described.

CHARLES S. BEARDSLEY.
SIMEON WOOD.

No. 6460.—*Improved method of manufacturing Drop Shot.*

What I claim as new and desire to secure by letters patent of the United States, is the application of an ascending artificial current of air, to cool the descending metal, in the manufacture of drop shot.

DAVID SMITH.

No. 6461.—*Improvement in Speeder Fliers.*

What I claim as my invention, and for which I wish to obtain letters patent, is the making of the flier of hollow tubular arms, constructed as herein described, of equal thickness throughout, combined with the top and bottom piece, substantially in the manner and for the purposes set forth, whereby the condensation of moisture is almost entirely obviated, which is so injurious in practice with the ordinary flier; the tube through which the roving passes is enlarged to the greatest possible dimensions, the parts are greatly increased in stiffness and lightness, and are found to be more durable, and require less power to drive them, and by this mode of construction, I am enabled to use a material, to wit, steel, that has never before been deemed practicable.

T. T. ABBOT.

No. 6462.—*Disc Cut-off acted upon and regulated by the Governor.*

What I claim as my invention and desire to secure by letters patent, is the apparatus set forth in the above specification, viz:—

A cylinder moving freely on the spindle of the governor of the steam engine, and operated by the balls thereof, having therein a slot or slots with one vertical and one inclined side, by means of which levers and other apparatus arranged essentially as described in the above specification, regulate the opening and shutting of a throttle valve in the steam pipe, so as to cut off the steam at any desired portion of the stroke, varying according to the speed of the engine.

WILLIAM McCAMMON.

No 6463.—*Improvements in Cotton Gins.*

I do not claim the frame, gearing, rollers, brushes, vibrating hopper and fingers of the roller cotton gin as new.

But what I do claim as my invention and desire to secure by letters patent in the before described improved roller cotton gin, is first, the combination of the adjustable bearings or boxes C K, and screws I F and C^2, with the rollers H *h*, and hinged caps M, for supporting, holding and adjusting the rollers at the several points between their ends, where said bearings are applied and are liable to wear, arranged and operating substantially in the manner and for the purpose set forth, by which the operator is enabled to retain a parallelism of revolving surfaces, however unevenly the bearings may wear, the rollers being made to coincide by separate and independent screws and taps or wedges, or in any way by which the same object may be attained, and by which the rollers shall be made to produce equal pressure on the cotton wool as it passes between them.

Second. I likewise claim the combination of the hinged caps M, with the hinged plate N, forming the upper end bearings, and the brush block S^2, and brushes S, arranged and operating in such manner as to admit of their being raised from the rolls.

WM. Y. LAYTON.

No. 6464.—*Improvements in Mill Shafting.*

I do not claim the suspending a box or bearing on pivots, this having been done before; nor do I claim the making the hanger in several parts; but what I do claim as my invention and desire to secure by letters patent, is the general arrangement and construction of the complete hanger with or without the oil-catcher forming a part thereof, made substantially in the manner and for the purposes herein above described.

EDWARD BANCROFT.

No. 6465.—*Improvement in Hames.*

What I claim as my invention and desire to secure by letters patent, is hinging the cliffs to the hame, and extending them back to the girth, substantially as herein described, for the purpose of holding the hame flat against and in contact with the entire length of the shoulder of the horse, in every position he may assume, while in the act of pulling.

JOSEPH W. BRIGGS.

No. 6466.—*Method of Opening, Shutting, and Fastening Blinds.*

What I claim as my invention and desire to secure by letters patent, is the combination of the turning rack ( ) with the fixed and moveable pinions ( ) attached to the hinge ( ) substantially in the manner and for the purpose herein described.

WESLEY CHASE.

No 6467.—*Improved Key-hole Protector.*

I lay no claim to a box made so as to permit the slide to move out of it as a bolt does out of a common lock; but what I do claim, is a series of slide plates or tumblers, or their equivalents, and a key passage D C E, for operating the same (by means of a key) so applied to the slide F, and enclosing case A, as to enable a person to insert the key and throw or move the slide or gate forwards or backwards without, either while the slide or gate is being thrown forwards, or is being retracted, there being any such communication

with the interior of the case, as will allow of the admission of gunpowder or any explosive solid material therein, substantially as above specified, the said slide or bolt tumblers and key passage being enclosed or included in a close box A, and the whole forming together a "key hole protector," as explained.

EDWARD KERSHAW.

No. 6468.— *Improvements in Propelling Vessels by Reaction.*

I do not claim propelling vessels by discharge of water, nor do I claim discharging the water through different apertures that may be closed at pleasure, to steer the vessel; nor do I claim the application of any of the well known forms of centrifugal pumps to this particular purpose; but what I do claim as my invention, and for which I desire letters patent, is—

First. The combination of a centrifugal pump, constructed substantially as herein described, with the curved guide plates "X X," figure 7, by which means the water is put in motion, and raised and discharged with less expenditure of force than the ordinary means now in use for propelling vessels by means of pumps.

Second. I claim the bent nozzle pipe attached to the stationary pipe, and capable of motion in a vertical plane, by means of which the water may be discharged either fore or aft, up or down, with only one aperture, and without the use of valves.

M. W. RUTHVEN.

No. 6469.—*Improved method of lifting Vessels over Shoals.*

What I claim as my invention and desire to secure by letters patent, is the combination of expansible buoyant chambers, placed at the sides of a vessel, with the main shaft or shafts C, by means of the sliding spars or shafts D, which pass down through the buoyant chambers, and are made fast to their bottoms and the series of ropes and pulleys, or their equivalents, in such a manner that by turning the main shaft or shafts in one direction, the buoyant chambers will be forced downwards into the water, and at the same time expanded and filled with air for buoying up the vessel by the displacement of water, and by turning the shaft in an opposite direction, the buoyant chambers will be contracted into a small space, and secured against injury.

A. LINCOLN.

No. 6470.—*Improvement in Machines for Jointing Staves.*

I claim the combination of the inclined angular levers (*b*,) with the oblong plates (*d*,) secured to the edges of the sliding frame B, for holding the ends of the stave during the operation of jointing, as described before.

WILLIAM H. SEYMOUR.

No. 6471.—*Improvement in Imitations of Marble.*

What I claim as my discovery and desire to secure by letters patent in the before described process of marbling minerals, woods and other substances, is

First. The employmont of strong acids, as herein described, in the preparation and application of colors for producing appearances of marble on woods and minerals.

Second. I claim the application of lime and nitre, as receiving mordants adapted to minerals and wood, where veins or variations are to be produced, imitating marble, as herein set forth.

Third. I claim the use of mucilaginous pastes composed of corn meal, slippery elm bark, or rice water, applied to canvas, paper, gum elastic, &c., &c., for purposes stated in the specification.

Fourth. I claim the process of preparing and of transferring the colors from a temporary to a permanent ground, in the manner and for the purposes described.

Fifth. I claim the composition of glass, lime, shellac, nitro muriate of zinc, or aqua regia and alcohol as a compound hard polish for marbling wood and porous mineral surfaces, as before described.

SAMUEL W. DAVIS.

No. 6472.—*Improvement in Spring Saddles.*

What we claim as our invention and desire to secure by letters patent, is the combination and arrangement of the bent tension springs C C, for supporting the saddle seat, with the pommel and cantel of the tree, in such a manner as to effectually preserve the proper form of the springs, and also prevent all upward reaction and tremor of the same when in use, substantially as herein set forth, to wit: securing the front ends of the spring C C, to the sides of the pommel by means of bolts or screws, and springing the rear ends of the said springs into inclined groves *e e*, formed in the cantel and confining them therein by the screws *f f*, passing through slots in the springs into the bottoms of the said grooves *e e*.

JEREMIAH RHOADES.
WILLIAM POULEY.

No. 6473.—*Improved Shank for Mineral Door Knobs.*

Having thus fully described the nature, construction and operation of my invention, what I claim as new and desire to secure by letters patent, is making mineral knobs or other analogous articles, such as curtain pins, draw handles, &c., by inserting a tubular metallic shank (with or without slots or a longitudinal slit) into the vitreous or earthen matter at a proper stage of the process, so that the quantity of metal in proportion to the bulk of mineral admissible in the case and comparatively to the extent of surface in contact with the mineral is very small, and the mineral consequently allowed to take its set about, within, or around the more or less elastic shank, without any undue strain upon or disturbance with its crystallization; thus rendering the destructive tendencies arising from the unequal expansibility of the metal and mineral too slight practically to endanger the soundness and durability of the finished knob or other analogous articles, such as curtain pins, draw handles, &c.

JOSHUA LAIRD.

No. 6474.—*Improvement in Scythe Nibs.*

What I claim as my invention and desire to secure by letters patent, is the wrench part *b*, of the screw rod, as seen in figure 7, combined with the rings *c* and *d*, for fastening the nib upon the snath, as described and represented, to effect the objects stated in the first, second, third and fourth particulars herein before stated.

DAVID SAWYER.

No. 6475.—*Improvement in Harvesters of Clover Heads.*

What I claim as my invention and desire to secure by letters patent, is—

First. The combination and arrangement of the transverse pendent finger

bar I, the mortised right angled plates F, adjustive slide bars G, and knife or cutter K, with the revolving axletree of spring conveyor bars P, arranged and operating in the manner described, by which the heads of clover are severed from the stems or stalks, and conveyed to a receiver.

Second. I also claim the combination of the right angled rods L, fingers J, and pendent bar I, with the transverse timber M, for adjusting the knife and fingers longitudinally and vertically in connection with the spring conveyor bars P, as described and represented. JOHN HINTON.

No. 6476.—*Improvement in Harvesting Machines.*

Having thus fully described the nature and construction of my improvements, what I claim therein as new and desire to secure by letters patent, is constructing the platform separate from the other frame work, as described, so that it can be readily put together or removed and the mower attached, as herein fully described and made known.

ALFRED JAMES PURVIANCE.

No. 6477.—*Improvement in Buckles for Harness.*

What I claim as my invention and desire to secure by letters patent, is the safety plate, buckle frame and tongue, combined together in the manner and for the purposes set forth in the accompanying drawing and specification.

HIRAM TODD

No. 6478.—*Improvement in Cooking Stoves.*

What I therefore claim as of my invention, is the combination of the central upright steam column E, with the stationary top plate D, and the fire chamber made to rotate or turn around underneath the said top plate, all substantially as above specified.

I also claim the plate K′, and space M, over it, as combined with the fuel chamber and rotary plate I, and made to revolve simultaneously with them in manner and for the purpose essentially as above specified.

DANIEL DUNHAM.

No. 6479.—*Improvement in Cooking Stoves.*

What I claim as my invention and desire to secure by letters patent, is the dropping of the flue *s t*, below the level of the hearth plate, in combination with the two ovens, arranged in the manner herein set forth and described.

HORACE HALBERT.

No. 6480.—*Direct and Counter Motion Winch.*

I do not claim to have invented a winch head, or any of the parts herein described and shown, irrespective of the manner in which I have applied and used them; but I do claim as new and desire to secure by letters patent of the United States, the application of the female ratchet 13, conjointly with the mechanical arrangement of the head or cap *d*, with the two reversing pawls 9 and 10, and lever socket 7, to produce a winch that shall be worked by a handspike or lever, moving in either direction on the winch centre, for the purposes and substantially in the manner before described.

CHARLES PERLEY.

No. 6481.—*Improvement in Machinery for cutting Welts for Shoes.*

What I claim as my invention, is the combination of the strip holder with the knife, base block, spring gauge plate G, spring support plate L, and ledge F, the whole forming a machine for manufacturing welts, substantially as above specified.

CHARLES ROGERS.

No. 6482.—*Improved method of attaching the Tang to the handle of Table Cutlery.*

What I claim as my invention, is the above described mode of constructing and combining or fixing together the handle and tang of the blade of a knife or piece of cutlery, the same consisting in making the said tang with one or more stationary studs or projections, in combination with making the main tang passage of the handle, with lateral and transverse passages for the entrance and reception of the said projection or projections, during the process of cementing, all substantially as herein before specified; the handle by such means being firmly secured to the blade or tang thereof, and so as to permit no appearance of any rivet on its external surface.

DAVID N. ROPES.

No. 6483.—*Improvement in Bedstead Fastenings.*

What I claim as my invention and desire to secure by letters patent, is the construction of metallic fastenings, for confining the rails and posts of bedsteads to each other, of such forms that when the portions of the fastenings secured in the ends of the rails are inserted into the portions of the fastenings attached to the posts, a blow or downward pressure upon the rails will cause the ends of the rails to be closely drawn against and secured to the posts, when this is combined with the arrangement by which the elevation of the rails for a short distance will permit them to revolve and detach themselves from the cords or sacking that may be connected to them, and also disconnect the portions of the fastenings projecting from the extremities of the rails from their hold upon the fastenings made fast to the posts, without withdrawing one from the other, substantially in the manner and for the purpose herein set forth.

DEVOLT STOTLEMEYER.

No. 6484.—*Improvements in Boring Machines.*

What I claim as my invention and desire to secure by letters patent, is the combination of the boring apparatus with the four jointed posts B, C, D, and E, the mode of adjusting the frame G, by means of the straps F, and H, and the windlass shafts and the jointed post, as herein described.

WILLIAM HENRY WILLCOX.

No. 6485.—*Improvement in Stops for Carpenters' Benches.*

What we claim as our invention and desire to secure by letters patent, is that peculiarity of the construction of the socket C, D, which consists in the vertical aperture K.

LEBBEUS AUGUR.
JAMES L. LORD.

No. 6486.—*Improvement in Pumps.*

What I claim as my invention and desire to secure by letters patent, is the union of two parallel pump cylinders, by means of a curved pipe, as herein described, and the working of pistons with valves in each, said pistons being united in motion and the valves arranged, substantially as herein set forth. I also claim the union of two such pumps in the manner and for the purpose herein described. GEORGE W. FULTON.

No. 6487.—*Improvements in Looms.*

Having thus fully described my improvement, what I claim therein as new and for which I desire to secure letters patent, is the combination of the quadrant, wheel or trammel with the cam shaft of a power loom, by means of which I can locate the said shaft in the position of the crank shaft, and dispense with one shaft and the ordinary gearing connected therewith.

JOHN WILSON.

No. 6488.—*Improvement in Gates.*

Having thus described my invention, I shall state my claims as follows:

What I claim as my invention and desire to have secured to me by letters patent, is a single or double gate, constructed substantially as herein above described, so as to turn up vertically by the parallel movement of the rails, &c., in lieu of swinging each way in the ordinary manner.

LORENZO SMITH.

No. 6489.—*Improvement in Brakes for Carriages.*

What I claim as my invention and desire to secure by letters patent, is—First. The combination of the levers P, P, with the levers L, L, rods N, N, bar G, sliding rod H, and rubbers F, F, arranged and operated substantially as above described and for the purpose set forth.

GIDEON GRIEST.

No. 6490.—*Improvement in Cockeyes for Harness.*

Having thus described the manner of constructing my improved cockeye, what I claim therein as new and desire to secure by letters patent, is the combination of the loop of the trace with a sectional cross piece, (B,) and a cockeye, (A,) whereby the trace is secured to a swivel cockeye without impairing its strength, and all the metallic parts are adapted to being made of cast metal. JOSEPH W. BRIGGS.

No. 6491.—*Improvement in Extension Machines for raising Bricks, Mortar, &c.*

Having thus fully described my machinery for raising bricks and mortar for buildings and other purposes, I do not claim the mode of extension or of elevating the platforms, but I claim combining the two series of extension frames, substantially as described, so that one may act as a counterpoise to the other when in use, and that when out of use the two frames may be brought down upon a level, for convenience of transportation, and occupy but little room, and also that the relative height of the series may be adjusted, for the purpose and in the manner described, or by any analogous mechanical devices.

JAMES COX.

No. 6492.—*Improvement in making Ivory fine-tooth Combs.*

What we claim as our invention, and desire to secure by letters patent, is the constructing a comb of four pieces of ivory or other material, united substantially in the manner herein set forth, to wit; two comb plates *a a*, having their inner edges bevelled off and joined to each other by means of the two strips *b b*, placed opposite to each other, over the bevelled edges of the plates (*a a*,) and connected by a row of rivets passing through the centres of the strips, and through the bevelled edge of each comb plate, as described herein, and represented in the accompanying drawings.

FENNER BUSH.
JULIUS H. PRATT.

No. 6493.—*Improved Railroad Turnout.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the switch rails A A, with the frog latch F, in such a manner that the frog latch F, is forced to move simultaneously with the switch rails A A, by means of a series of rods and levers, arranged and connected substantially as herein described.

CARLTON DUTTON.

No. 6494.—*Improvement in Bee Hives.*

What I claim as my invention and desire to secure by letters patent, is the employment of the slide door 3, in combination with the open galleries above and below the same, for the purpose of separating or combining, at the will of the apiary, the several tiers of chambers, as described and represented. I also claim the use of the dark chamber *i*, with a passage out of the same, through the main body of the working hives, for the purpose of domesticating wild or foreign bees, by compelling them in leaving the dark chamber to pass through or into the working chambers of the bee house.

ARZA GILMORE.

No. 6495.—*Improved Trap and method of Setting it.*

What I claim as my invention and desire to secure by letters patent, is the combination of the hook, the straight bar to which it is attached by a pivot, and the spring, the whole arranged and acting substantially as herein described, by which I am enabled to set the trap without a catch or lock of any kind.

THOMAS A. DAVIES.

No. 6496.—*Improved Tent Frames.*

Having thus fully described my improved tent, what I claim therein as new, and for which I desire to secure letters patent, is constructing a tent substantially in the manner described; with a series of poles jointed together at the centre, and having spade formed feet, by which it is anchored to the ground without pins or other fastening, as herein fully set forth.

JESSE E. DOW.

No. 6497.—*Improvement in Grain Drills.*

What I claim as my invention is shifting the hoppers back and forward with couplings and levers, substantially as set forth, to continue or stop the seeding, in combination with the shaker, having moveable dies therein, for reg-

ulating the quantity of seed, and distributing the same, and moved substantially as herein described.

EDWARD STEACY.

No. 6498.—*Improvement in Wind Mills.*

What I claim as my invention and desire to secure by letters patent, is the combination of the curved bars E, connected to the radial arms B, by hinged plates or bars *e*, connecting bars *g*, hubs *h r*, connected together by a rod *s*, forked lever *k*, and governor *o*, for regulating the speed of the wheel, in the manner herein described.

I likewise claim the mode of raising and lowering the sails, when desired, by means of the bands or cords L, attached to the hub K, connected to the hub *r*, below by the rod *s*, passing over the pullies *t u v w*, and attached in their course at the point *x*, fig. 3, to the cords *p*, passing over the pullies *q*, and secured to the peaks of the sails, and the worm or screw pullies *d*, on the rollers D, as herein set forth.

CHARLES B. HUTCHINSON.

No. 6499.—*Improvement in Parlor Cooking Stoves.*

I claim the employment of a double top plate, constructed as described, the upper part of which is whole, and is removable at pleasure, while the lower portion is furnished with apertures for boiler holes, which are covered with ordinary covers, as set forth, both parts of the double top being made the full size of the stove.

E. R. BROWN.

No. 6500.—*Improvement in Pumps.*

What I claim as my invention and desire to secure by letters patent, is the combination of the nozzle with the pump barrel, in such a manner that the nozzle can be readily changed from side to side, and secured in any desired position, substantially as herein represented and described.

BIRDSILL HOLLEY.

No. 6501.—*Improvement in Corn Ploughs.*

What I claim as my invention and desire to secure by letters patent, is the auxiliary cultivator teeth H, in the outer ends of the drag F, as described and represented.

STEPHEN COATS.

No. 6502.—*Improvement in Metallic Alloys.*

What I claim as my invention and discovery and desire to secure by letters patent, is the composition, as described, composed of zinc and iron combined with each other, when in a fused state, and the application and use of said composition to the purposes above specified, and to any other useful purpose to which it may be applied.

H. B. BABCOCK.

No. 6503.—*Improvement in the consumption of Fuel in Steam Boiler and other Furnaces.*

Having thus described my improvements in burning fuel, what I claim therein as new and for which I desire to secure letters patent, is the employment, arrangement, and combination of apparatus, constructed substantially as herein described, for consuming the gases arising from ignited fuel, by the introduction of decomposed steam, or the gases resulting therefrom, and atmospheric air in a highly heated state over fire. I also claim the revolving grate, constructed and operating as herein above described and made known.

CHRISTIAN BURCKHARDT.

No. 6504.—*Improvement in Seed Planters.*

Having thus described the construction and operation of my improved seed drill, what I claim therein as new and desire to secure by letters patent, is—

First. The manner of guiding the machine by changing the position of the tongue, substantially in the manner herein set forth.

Second. The combination, substantially as described, of the lever *r*, and link *q*, ... with the beam K, and tooth L, for the purpose of drawing back the point of the tooth at the same time the beam is raised, whereby the tooth is easily kept clear of sods, roots, and other obstructions, and the danger of its getting broken diminished.

J. D. WILLOUGHBY.

No. 6505.—*Improvement in Smut Machines.*

Having thus fully described my improved machine for clearing the garlic and smut from grain, what I claim therein as new and for which I desire to secure letters patent, is the combination with each other of the inclined and horizontal runners *t* and *f*, and constructed substantially as above set forth, for the purpose of more perfectly separating smut and garlic from wheat.

JOSEPH HEYGEL.

No. 6506.—*Improvement in Sun Dials.*

I am aware that it is not uncommon to place on a dial plate a scale of the sun's declination, I therefore lay no claim to such; but that which I do claim as my invention, is the shadow indicator or pin I, and declination scale, or scale of months and days, in combination with the gnomon, substantially in the manner and for the purpose as specified.

JAMES SCOTT.

No. 6507.—*Improved Steering Apparatus.*

Having thus described my improved steering wheel, I will state my claim as follows:

What I claim as my invention and desire to have secured to me by letters patent, is the combination of a right and left threaded screw on the hand wheel shaft *a, a*, with two half nuts *d, d*, arranged one on each side of said screw, and traversing in guides opposite to each other, as herein above set forth, said nuts being connected to the rudder head, either by the long arms *o, p, o, p*, as in the first described arrangement, or, as in the second, by the slotted arms *a', a'*, and sliding buttons *c', c'*, all arranged and operating substantially as herein above set forth.

JESSE REED.

No. 6508.—*Improvement in Sub-soil Corn Ploughs.*

What I claim as my invention and desire to secure by letters patent, is the construction of my sub-soil plough shares, in combination with the small

ploughs fastened above them on the same standards, and having a space between them, in the manner and for the purpose represented and described.

HENRY BACON.

No. 6509.—*Improved Shank Painter Stopper.*

We do not claim to have invented any of the foregoing parts, irrespective of the manner in which we have arranged and applied them for these purposes; but we do claim as new and of our own invention, and desire to secure by letters patent of the United States, the application, arrangement, and combination of the parts described and shown, by which the lock piece *e*, with ears or shoulders 8, 8, places any ultimate strain upon the fixed fillets 7, 7, and through the lug 12, and pin 11, secures all the operative parts from moving by accidental causes, at the same time providing means, through the attached chain 10, by which one man can release or "let go" the anchor, without other manual help, and without other mechanical aid than that furnished by the parts attached and employed, when constructed and combined substantially in the manner described and shown.

CHARLES PERLEY.
JOSHUA TERREY.

No. 6510.—*Chills for casting Rasps, Files, &c.*

I would have it understood that I do not claim as my invention the making chill dies in one or more pieces for casting, but what I do claim as my invention and desire to secure by letters patent, is the method herein described, of casting floats, rasps, graters, etc., by means of a series of chill dies, constructed and used as herein described, the essential in the construction of such chills being that there is one piece for every series of teeth, and that the latter are cast in indentions formed between the chills, the same being formed substantially in the manner and for the purpose herein set forth and made known.

EZRA RIPLEY.

No. 6511.—*Improvement in Cultivators.*

What I claim as my invention and desire to secure by letters patent, is the mode of adjusting the position of the shovels D, so as to throw the earth *from* or *toward* the rows of corn, or to the right and left at pleasure, by means of the before described combination of the levers L, links N, and adjustive bars I, with the parallel slotted bars B, and oblique hinged bars Q, as described.

GEORGE W. BROWN.

No. 6512.—*Improvement in Shoulder Braces.*

Having thus fully described the parts and combination of parts and the operation of the shoulder brace and chest expander, and shown the several modes in which the instrument may be rendered useful, I hereby declare, that I do not claim to have invented a metallic coiled spring with horizontal arms, although I do not know of any spring of the kind herein described having been essayed for the same purpose, or the shoulder straps, or any of the separate parts of the instrument; but what is claimed therein as my invention, is the employment of the metallic coiled spring, with one or more coils in combination with shoulder straps, with or without islet holes and lace, tugs and pads, substantially as and for the purposes described.

S. S. FITCH.

No. 6513.—*Machinery for operating Railroad Gates by means of the Locomotive.*

Having thus described my invention, I claim the vibrating cam levers G, and H, attached to the bars F F, in combination with the cam block O, and the spring L, and the rope or chain M, passing over the pulley N, and the spring K, for the purpose of closing and opening the gate by the action of the projecting bar I, of the locomotive upon the vibrating levers G and H, in the manner substantially as herein described.

RICHARD COFFIN.

No. 6514.—*Improved Gun Lock.*

What I claim as new and desire to secure in letters patent, is the adjustable slot *d*, in the centre hole and fulcrum of the trigger B, acting in direct combination with the spring D, and also in combination with the arm *e*, of the hammer A, and the main spring C, substantially as described.

WM. W. MARSTON.

No. 6515.—*Improvements in the Boom Derrick.*

Having thus fully explained my invention, what I claim therein as new and desire to secure by letters patent, is the drum F, as constructed with its inner shaft X, with its arrangement for giving independent motion, by means of which the ropes can be housed and protected in combination with the adjustable rotary cross beam I I, arranged and operated as described, by means of which combination and arrangement I am enabled to have in wear only such portions of the ropes as the operation of the machine and the varying elevation of the wall or structure may demand.

GEORGE E. WARNER.

No. 6516.—*Improvement in Seed Planters.*

I do not claim the wheels, planting cylinders, hoppers, frame, hinged beams, cultivator teeth, funnel conductors, or seed spouts, as these are made and arranged in the usual manner; but what I do claim as my invention and improvement and desire to secure by letters patent, is—

First. The combination of the roller L, springs K, and lever M, with the rack N, to which the cultivator teeth G, are affixed for regulating the depth of furrowing in various kinds of hard or mellow soil, without the necessity of altering the position of the transverse beams to which the rear ends of the parallel longitudinal beams H, are connected.

Second. I also claim the manner of preventing the seed passing from the hopper through the channels of the planting cylinder, when the cultivator teeth are raised from the ground, or whenever it is desired to stop the planting operation by means of the combination of the transverse rising and falling bar J, cams S, bent rods R, sliding bar Q, valve rods P, and springs T, with the frame A, as described.

Third. I likewise claim placing the radial pins in the channels of the planting cylinders, in the manner and for the purpose above set forth.

DAVID DIEHL.

No. 6517.—*Improvement in Harvesters.*

What I claim as my invention and desire to secure by letters patent, is the combination of a series of removable cutters, with the links of an endless revolving chain which carries them successively into contact with the grass or grain to be cut, substantially as herein described, whether the cutters be contiguous or placed at intervals upon the chain.

I also claim making one end of each cutter sharp, in order that by pressing against the adjacent end of the next cutter, straw, grass, or other intervening obstructions may be cut in two and allowed to pass out, the cutters thus freeing themselves from obstructions which might otherwise choke or break them.

I also claim placing the bundles or sheaves of grain at right angles to the path of the machine, by means of a second rake (H,) combined with the first, substantially as herein set forth.

I also claim moving or turning the first rake by cords, chains or belts, arranged and operated as described, or in any other substantially similar manner.

I also claim vibrating the second rake (H,) and turning its teeth as herein set forth, whether the devices employed to effect these movements be such as described, or others equivalent thereto.

I also claim changing the frequency of the alternations of the rakes by means of the cones of wheels (3 4 5,) and pinions (3′ 4′ 5′,) or other equivalent device for the purpose of varying the size of the sheaves, as herein set forth.

NELSON PLATT.

No. 6518.—*Improvement in Harness Saddles.*

Having thus described my improved harness saddle, what I claim therein is new, and desire to secure by letters patent, is disconnecting the pads from the skirts and girth when the pads are hinged to and placed far enough beneath the tree to admit of free motion, to conform to the shape and changing positions of the horse's back, without coming into contact with the skirts or girth, which are attached to the tree, as herein set forth.

JOSEPH W. BRIGGS.

No. 6519.—*Improvement in Steam Pipes for Sugar Boiling.*

What I claim as my invention and desire to secure by letters patent, is connecting the two compartments of the main steam pipe of the evaporating tubes of evaporating pans, by means of a series of syphon tubes, which receive the steam from one compartment and discharge it into the lower compartment, whereby I am enabled to obtain a larger amount of heating surface than by any other known plan.

ALFRED STILLMAN.

No. 6520.—*Improvement in Drill Barrows.*

What I claim as my invention and desire to secure by letters patent, is the combination of the upper slide *i*, with the lower (*m*,) the former moving at least twice for one movement of the latter, the two being made and arranged in the manner and for the purpose, as herein set forth.

GEORGE COLBY.

No. 6521.—*Improvements in Machines for Cutting out Felloes.*

What we claim as our invention and desire to secure by letters patent, is the combination of the cutter head and beam C, with the levers G *j*, cross head *k*, moving between upright slides, and attached to the lever *j*, by the connecting rod *l*, iron straps *m*, and oblong plate, screw shaft H, passing through the cross head, and provided with the friction wheel *o*, which is alternately thrown into gear with the friction wheels *f p*, on the upper ends of the shafts F I, by means of the horizontal beam K, pulleys and weights *u v*, and lever *w*, for elevating and depressing the cutter beam and cutters, in the manner and for the purposes herein set forth.

JOSEPH ADAMS.
LEVI ADAMS.
LUTHER HENRY MOORE.

No. 6522.—*Improved Pad Lock.*

What we claim as our invention and desire to secure by letters patent, is the main spring *c*, answering three distinct purposes; viz. throwing out the bow, holding back the bolt proper when unlocked, and forcing it forward in locking, its power increasing during the process of locking and unlocking, while it is perfectly at ease when unlocked; all of which is constructed and operates substantially in the manner herein above described.

CONRAD LIEBRICH.
FRANCIS CHARLES GOFFIN.

No. 6523.—*Improvements in Barrel Machinery.*

What I claim as my invention and desire to secure by letters patent, is—

First. I claim the combination of the revolving dogs (*m*,) the pawls (*n*,) the disengaging levers U, the vibrating feed lever R, and the stops *q q′*, whereby the slab is secured on the carriage, and successive staves sawed from the same slab.

Second. I claim disconnecting the carriage (N,) from the feed gear during its retrograde motion, while the slab is being fed towards the saw (J,) substantially in the manner and for the purpose herein set forth.

Third. I likewise claim the combination of the oscillating saw (J,) with the curved gated case (T,) whereby the stave is securely held during the action of the saw, in the manner and for the purpose herein set forth.

Fourth. I likewise claim the combination of the stave carriage Y, with the spring dogs, and spring hold fast *t*, and stop *v*, whereby the stave is securely held down during the action of the saws, and then thrown from the machine.

Fifth. I also claim the combination of the concave and convex pressure feed rollers (*c′ c″*) and the self adjusting spring clamps or rests (K′ K″,) with the concave and convex cutters (A′ A″,) when the several members are arranged in the curve of the longitudinal section of the stave, as herein set forth.

REUBEN MURDOCK.

No. 6524.—*Improvements in Trucks for Railroad Cars.*

In order the better to be understood, I have described some things in connection with my improvement, which I do not claim as my invention; but that which I do claim and wish to secure by letters patent, is the connecting and combining in the carriage for carrying burdens and passengers upon railroads, one or more intermediate pair of cylindrical wheels, or wheels nearly

cylindrical, without flanges, loose upon their axles, or otherwise independent in their action, so that any one of these intermediate wheels may revolve faster or slower than the others, in connection with guide wheels having either one or two flanges, they being made fast to their axles, and also either for a six or eight wheel car, all the wheels of the same carriage, both fast and loose on their axles, being attached to one and the same stiff frame, by means of springs and bearing boxes, or otherwise. This combination in a railroad carriage, as above described, I claim as new and of my invention. I do not however claim cylindrical wheels on separate frames, made fast to and revolving with their axles, these having been used in steam locomotive engines as drivers; but I do claim the loose or independent wheels without flanges, in connection with guide wheels, having flanges, and the attachment of the wheel to the one stiff frame, as above described.

ISAAC KNIGHT.

No. 6525.—*Improved Construction of the Master Wheel of Horse Powers.*

I do not claim making a cog wheel of segments, as this has been heretofore done in various machines; but what I do claim as my invention and desire to secure by letters patent, is making the rim of the master wheel of a horse power within which the horse walks, of annular segments (*d*,) of cast iron, (the cogs being vertical and on the edge of the segment,) the inner and outer peripheries, of which are grooved and have segmental bands of wrought iron (*e e'*,) fitted therein; the wrought iron segments breaking joint with each other and with the cogged segments, and the whole being bound together by through bolts; thus making a portable rim wheel sufficiently strong and rigid to maintain its form, and perform its duty without the assistance of framing.

JOHN A. TAPLIN.

No. 6526. — *Improvement in Corn Shellers.*

Having thus fully described my improvements, what I claim therein as new and for which I desire to secure letters patent, is the employment of *concave* runner, by means of which the cobs are more freely discharged, armed with spiral rows of teeth or ribs, combined with the inclined breast beam and spring block, substantially in the manner and for the purpose set forth in the preamble and specification.

JACOB MUMMA.

No. 6527.—*Improvement in Churns.*

Having thus fully described my improved churn, what I claim as new and desire to secure by letters patent, is making the moving parts of the churn, consisting of a *vertical shaft and rotary dasher*, constructed substantially as above specified, to be suspended and combined with the moveable lid B, as above described, thereby dispensing with a pivot or step at the lower end of shaft, for the purposes set forth, so that said moving parts can be readily lifted from the churn and again be replaced; the whole operating in the manner above described.

CHAPMAN WARNER.

No. 6528.—*Improvement in Musical Notation.*

Having thus described my improved notation, what I claim therein as new and desire to secure by letters patent, is —

First. The arrangement of distinct characters to denote the fingering of music, made and arranged substantially in the manner herein described.

Second. Giving the twelve musical intervals distinct names, so that the use of the words flat and sharp is entirely avoided, and with them all the confusion naturally arising in the mind of a beginner.

Third. Representing the sounds usually called natural by one uniform color, and those commonly called flats and sharps by another uniform color, so that they may be distinguished from each other by a mere inspection of the musical character representing the note, without the use of chromatic signatures.

ERNEST VON HEERINGEN.

No. 6529.—*Improvement in Inhalers or Lung Protectors.*

What I claim as my invention and desire to secure by letters patent, is —

First. I claim the nose or mouth joint having the piece I, made to fit the nostrils or the mouth, in combination with the valves A and B, for the purpose of causing the air to enter and be discharged through separate orifices, as herein described.

Second. In combination with the said nose or mouth joint and valves, I claim the filterer D, either with or without the tube E, as described.

LEWIS PHECTIC HASLETT.

No. 6530.—*Improvement in Cooking Stoves.*

I wish it to be distinctly understood that I do not limit myself to the application of this method of lining and protecting plates to the shifting plates used in the tops of stoves, but that the same may be applied to the tops of stoves when made in any other way.

What I claim as my invention and desire to secure by letters patent, is the method, substantially as described, of equalizing the heat in the oven by combining with the diving flue at the back and the series of tubular flues at the bottom, with spaces between them, the return flue below the flue tubes, and the return flue at the back of the diving flue, substantially as described.

And I also claim the method of protecting the top plate of the stove or the parts thereof, by lining it or them with a perforated plate or plates, with some earthy cement or other refractory substance interposed between the plate or plates and the perforated lining, as described.

JORDAN L. MOTT.

No. 6531.—*Improvement in Reed Musical Instruments.*

What we claim as our invention and desire to secure by letters patent, is the converting the wind chest (B,) in which the reeds *m*, are located into an expansible sounding chamber by forming one side of it (the said wind chest) of a thin elastic sounding board (*c*,) placed in sufficiently near proximity to the reeds—when this arrangement is combined with the location of the valves on the outside of the wind chest or sounding chamber, substantially in the manner and for the purpose herein set forth.

B. T. BLODGET.
H. B. HORTON.

No. 6532.—*Improvement in Washing Machines.*

I do not limit myself to the materials, dimensions nor proportions set forth in these specifications and drawings of the machine in its various parts, but claim as my invention and desire to secure by letters patent, the combination

and arrangement of the front part of the box with its vertical flutings K, and of the vibrating fluted roller N, and pounders I J, for the purpose of turning the clothes, with the supports as described and represented herein.

DANIEL L. WALKER.

No. 6533.—*Improved Sculling Propeller.*

What I claim as my invention and desire to secure by letters patent, is the propeller *d*, suspended by and in combination with the shafts *a*, *a*, the levers *b*, *b*, and the shaft *c*, *c*, constructed and moving, (see figure 4,) substantially in the manner described and for the purpose herein above set forth.

ALEXANDER BOND.

No. 6534.—*Improvement in Cooking Stoves.*

I lay no claim to the extending of an oven space around a fire pot or chamber of combustion, so that the heat from the whole or any part or portions of the external sides of said fire pot or chamber may be communicated to the air within the oven; nor do I claim to so connect the oven by air pipes or otherwise, with a space around the fire pot or chamber, and having contrivances to admit cold air from without, that air which may pass into and be heated within said space may be conveyed into the oven; nor do I claim the invention of carrying the smoke and volatile products of combustion from the fire place or fire pot over, around, or against the whole or any part or portion of an oven; but what I do claim as my invention, is the herein above explained combination of the oven with the air space *e*, *f*, *g*, and fire chamber, by means of the sliding doors, as specified; the same being for the purpose of either enabling a person to make use of the oven either for baking or roasting, as specified, or to make use of it for baking while the roasting is done, in a roasting apparatus set up against the opening *k*, as herein before explained.

EBENEZER F. MARTIN.

No. 6535.—*Improved Gold Washer.*

I claim, in combination with the mercury bath, a surrounding channel or groove N, made to communicate therewith by a passage *h*, and applied so as to intercept the mercury which may be thrown out from the bath, whereby the mercury thrown out is again returned to the central cistern, without intervention on the part of the operator.

And, in combination with the elements above claimed, I claim one or more concentric mercurial rings, arranged between it and the cistern or bath A, the same not being made to communicate with the main vessel or bath by any passage, the same being for the purpose of intercepting the small escaped particles of mercury, and retaining them until so washed by the water that they will coalesce with the mercury contained in said ring or rings.

And I claim the central tube H, as well as its perforated water diffuser or tunnel I, in combination with the main hollow shaft, its bell mouth vessel or top, and perforated partition or separator G, the whole being made to diffuse and apply the water to the auriferous earth and mercury bath, and prevent packing of it within the tube C, essentially as specified.

WILLIAM BALL.

No. 6536.—*Improvement in Grain Drills.*

What I claim as my invention and desire to secure by letters patent, is the manner of connecting the planting tubes to the axle and seed box, substantially as herein represented and described, by which the person following after and attending the machine is at all times enabled to witness its operation, and see that each tube deposites its proper quantity of grain, or seeds in the drills, to wit: making use of pairs of parallel inclined bars, connected by hinge joints to the tubes and to the axle and seed box, with a groove formed in the lower bar of each pair, for conducting the grain or seeds from the seed box into the planting tube to which it is jointed.

AARON PALMER.

No. 6537.—*Rotating Tumbler Gun Lock.*

What I claim as new and desire to secure in letters patent, is the revolving tumbler A, having a continuous rotating forward movement, by which the hammer B, is raised and allowed to escape, through the intervention of a series of notches acting as cams on the arm O, of the hammer, substantially as described, and expressly as applied to gun locks. I also claim the said tumbler, as described and shown, in combination with the hammer B, trigger C, catch D, and springs E and F.

THOMAS W. HARVEY.

No. 6538.—*Improvement in Churns.*

We disclaim all right to the original invention of the churn; what we claim as our improvement and desire to secure by letters patent, is the introduction of the double inclined stops, as above described.

GEORGE E. GILL.
J. B. TILLINGHAST.

No. 6539.—*Improvement in Carding Machines.*

Having thus described fully my improved machine, what I claim therein as new and for which I desire to secure letters patent, is banding the top rollers or workers to the main carding cylinder, substantially in the manner and for the purposes set forth.

JOHN M'CARTY.

No. 6540.—*Improvement in Grain Carriers for Harvesting Machines.*

Having thus fully described our improvements and the mode of operation, what we claim therein as new and for which we desire to secure letters patent, is the employment, in combination, of a double series of endless bands *e*, *e*, and *f*, *f*, constructed and arranged substantially in the manner and for the purpose set forth, by which the grain is raked and carried over one side of the machine, as described.

And, lastly, we claim the receiver *m*, for collecting the grain into bundles, and discharging it from the machine at once, in the manner herein above made known.

JACOB J. MANN.
H. F. MANN.

No. 6541.—*Improvement in revolving horizontal Coal Grates.*

I do not claim a revolving grate combined with an external stationary case. All that I claim is:

First. The combination and arrangement of the four segmental hinged and sliding doors F, with the revolving grate B, constructed, arranged, and operated in the manner and for the purpose herein set forth.

Second. I claim the combination of the damper L, with the revolving grate, as described.

Third. I claim the combination of the protuberance N, on the inside of the case and doors of the grate for closing the right hand doors as the grate is revolved.

Fourth. I claim the combination of the double inclined plane M, with the case, and the projections on the doors of the grate for bolting the doors as the grate is turned.

Fifth. I claim making the journals G, of the doors with shoulders, g^1 g^2, on the upper and inner sides, by reducing the diameter of the journals in the manner and for the purpose described.

JOHN F. WEISHAMPEL.

No. 6542.—*Improvement in Seed Planters.*

Having thus described the construction and operation of my improved seed drill and planting machine, what I claim therein as new, and desire to secure by letters patent, is the combination of the teeth z, hinged at y on joint pins, with the beams C, and springs x, substantially as described, whereby any of the teeth may turn aside or rise over stones and other common obstructions which they may meet; thus greatly diminishing the danger of being broken, and of throwing the machine out of its track.

EMANUEL MYERS.

No. 6543.—*Improvement in Melodeons.*

I claim my improved manner of arranging the reed with respect to the air passage, or opening n, the same being represented in figure 4, and consisting in bending the thin end of the reed down below the bottom of the opening, substantially in manner and so as to allow the air to operate on it as explained.

CHARLES AUSTIN.

No. 6544.—*Improvement in Atmospheric Churns.*

What I claim as my invention, and desire to secure by letters patent, is, the tubulated disk dasher E, surmounted by a hollow stem for churning cream by agitating and by admixing therewith atmospheric air, and the gathering the butter, when separated, into large balls or rolls, as herein set forth.

SAMUEL P. FRANCISCO.

No. 6545.—*Improvement in Winnowing Machines.*

What I claim as my invention is, the trunk F, gradually enlarged from below upwards, and communicating with the atmospheric current through the screen H, in combination with the hopper E′, and the fan placed at the end of the opposite vertical trunk D, to separate the chaff and other impurities from the grain, in the manner substantially as herein described.

B. D. SANDERS.

No. 6546.—*Improvement in self-regulating Dampers for Stoves.*

Having thus fully described my improvement, what I claim therein as new, and for which I desire to secure letters patent, is the employment of an expanding flexible plate, firmly secured at both ends, in combination with, and acting upon, a pendulum, lever, or valve, regulating the draft, substantially in the manner and for the purpose set forth.

BENSON OWEN.

No. 6547.—*Improvement in Cooking Stoves.*

Having thus fully described my improved summer and winter cooking stove, what I claim as my invention, and desire to secure by letters patent, is the surrounding the oven with flue spaces, when the said flue spaces are arranged and combined with each other, and with the fire chamber and smoke pipe, by means of dampers (B C,) in the manner and for the purpose substantially as herein represented and described.

ROSWELL WILSON.

No. 6548.—*Improved Lever to be placed on a railroad track, and acted upon by the wheels of cars or locomotives.*

I wish it distinctly understood that I claim no part of the wheels, signals, or turnouts, as my invention; these only show its application. What I claim as my invention, and desire to secure by letters patent, is the joint lever A, constructed and operating substantially as herein described, and applied on railroads for the purpose of giving signals and regulating turnouts.

J. W. HOFFMAN.

No. 6549.—*Improved Door-Holder.*

What I claim as my invention, and desire to secure by letters patent, is the method of constructing turnbuckles or fastenings for shutters and doors of all kinds, by attaching a plug or knob to the back of the shutter or door, the same fitting or passing into the cavity of a cup-shaped vessel through an aperture in a disc of India rubber, or other elastic substance, the said rubber being so regulated as to grasp the knob and keep the door or shutter back, substantially as described. EDMUND MORRIS.

No. 6550.—*Improvement in Drying Grain.*

What I claim as my invention, and desire to secure by letters patent, is the drying a *mass* of corn, or grain, or malt, or white lead, or flour, or meal, or similar substances, in a receptacle for the substance to be dried, having the air chamber placed within the receptacle, and under the mass or bulk of the corn, grain, flour, white lead, or other similar substance to be dried, and connected with a blowing or exhausting apparatus of sufficient power to drive or draw the air through and around the substances to be operated on, in the manner herein specified, or in any similar manner.

JOS. H. PATTEN.

No. 6551. —*Improvement in Harness adapted to Horse Rakes.*

What I claim as my invention, and desire to secure by letters patent, is the arrangement of the hanging straps M N, (or contrivances which hold up the thills) so that they may bear on the rump and hips of the horse, instead of on his back, at or near his shoulders in the usual way; and in combination with such an arrangement, I claim to make the short and flaring thills C D, made and applied to the rake head as above specified. I also claim the mode of arranging the tug straps O P, and their rear connections, that is, the arrang-

ing them obliquely with respect to the horse, and connecting them to the braces or rake head, as specified.

WARREN PARKER.

No. 6552.—*Improvement in Seats for Railroad Cars.*

What I claim as my invention and improvement, and desire to secure by letters patent, is the horizontal rod (*e*,) attached to the frame of the seat, in combination with the fixed standards (*b b*′,) when constructed and operating in the manner set forth herein.

AMOS W. SNOW.

No. 6553.—*Improvement in Hill-side Ploughs.*

I repeat that I claim as my invention the extension of the mould board, as above described, and the arrangement of the mould board so as to make it and the land side revolve together, and enable either the upper or lower edge to act as a share, and to throw the soil upon either side of the ploughman. I also claim as my invention, in combination with the above, the arrangement of the iron rod C D, and the iron bars L M, and its arm G H, so as to secure the mould board in a firm position when used. I also claim as my invention, the constructing of a three-sided land side, which is not fastened permanently to the wood work, but acts independently thereof, as herein specified and represented.

DANIEL ROBB.

No. 6554.—*Improved adjustable platform Animal Trap.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the spring spiked frame (F,) and adjustable platform (E,) made, arranged and connected in the manner and for the purpose herein set forth.

I likewise claim the combination of the hinged platform (E,) with the counterpoise (L,) for adjusting the platform so as to make the trap go off with more or less force, thus adapting it to animals of different sizes.

JAMES THOMAS.

No. 6555.—*Improvements in the Rotating Permutation Plate Lock.*

What I claim as my invention, and desire to secure by letters patent, is locking the indices to the permutation plates when the tumbler is thrown up to lock the bolt by means of the flanges, or other equivalent on the tumbler, substantially as herein described, to prevent the possibility of changing the permutation after the bolt has been locked, as described, when the lock is so arranged that the relation between the dials and permutation plates may be changed without opening the lock case, as described.

HENRY RITCHIE.

No. 6556.—*Improvement in Churns.*

I do not intend to limit myself to the particular number or proportions of the parts of which the agitator is composed, nor to the uses to which it may be applied; nor shall I limit myself to the use of any particular description of material in constructing the agitator.

What I claim as my invention and desire to secure by letters patent, is the series of floats or beaters (*a a a*,) formed and arranged as above described, so as by their thick inclined rear edges they shall, when their motion is reversed, gather the butter in towards the centre, and collect it there, substantially as above set forth.

Z. C. ROBBINS.

No. 6557.—*Improvement in Extension Tables.*

What I claim as my invention and desire to secure by letters patent, is first, the combination of the projecting pin *a*, and the groove *a*′, with the series of jointed levers, whereby the two ends of the tables are caused to recede from and approach each other in right lines, which ensures at all times the accurate meeting and jointing of the moveable and stationary leaves.

The manner of extending or contracting the table, and holding it in any given position by means of the combination of the turning rack F, and pinion *e*, with the slotted lever *f*, and catcher *g*, arranged and operated substantially as herein set forth.

The combination of the semicircular collets *m*, with the groove *n*, in the joint pin, for the purpose of securing the latter in place, and forming a bearing for its neck to turn in.

THOS. P. SHERBORNE.

No. 6558.—*Improvement in Instruments for Teaching Music with the Piano Forte.*

What I claim as my invention and desire to secure by letters patent, is—

First. The method of exercising and training the fingers of those who are learning to perform on the piano forte, by springs, weights, or other equivalent device, arranged as herein set forth, or in any other substantially similar manner.

Second. I claim the application to the piano forte of an adjustable rod with pins, sharp points, or any other equivalent device, attached to its upper surface, for the purpose of causing the wrists of the performer to be duly elevated.

Third. I claim the manner of teaching pupils to move their fingers, hands and arms below the elbow, parallel to the keys of the instrument, whether playing the first, last, or middle octaves, by confining the wrists to blocks which slide on a rod parallel to the front of the instruments, and adjustable to suit different performers, or any other analogous device by which similar results are produced.

E. VON HEERINGEN.

No. 6559.—*Improvement in Spark Arresters.*

What I claim as my invention and desire to secure by letters patent, is—

First. The deflecting and reverberating cap and the chimney in combination with the first series of inclined or curved shutes, below the top of the chimney, substantially as described.

Second. I claim the perforated diaphragm below the shutes in combination with the inclined shutes and cap, substantially as described.

Third. I claim the second series of inclined or curved shutes in combination with the first series of shutes, the cap and the chimney, substantially as described.

And finally, I claim the surrounding apertures leading into a receptacle for sparks, in combination with the two reversed series of inclined shutes, substantially as described.

JAMES A. CUTTING.

No. 6560.—*Improvement in Harvesters.*

What I claim as my invention and desire to secure by letters patent, is arranging a series of inclined knives (*b*,) diagonally across the spaces between the fingers (*a*,) the front end of the cutting edge of one knife projecting beyond the rear end of the cutting edge of the one next succeeding it, substantially as herein described, and acting in combination with revolving spiral cutters (*e*.)

I likewise claim attaching the pole (to whose hinder extremity the team is attached) to the hinder part of the carriage by a pivot (*n*,) in combination with the ropes (*o o'*,) and windlass (O',) by which it is turned, by which arrangement the machine can be turned in a small space and without inconveniencing the team. PELLS MANNY.

No. 6561.—*Improvement in the Boilers and Water Heaters of Locomotive Engines.*

I claim as my invention and desire to secure by letters patent—

First. The branch exhaust pipe surrounded by a water space combined with the ordinary exhaust pipe, so that a portion or the whole of the steam may be directed through either pipe, the whole being constructed substantially in the manner and for the purpose herein described.

Secondly. I claim the water case surrounding the smoke box into which the supply water is found to be fed into the boiler, by which I effect the double purpose of heating the water by the waste heat before it enters the boiler, and also protect the smoke box from destruction by the intense heat of the flues and cinders. THATCHER PERKINS.

No. 6562.—*Improvement in the attachment of Harrows to Ploughs.*

What I claim as my invention and desire to secure by letters patent, is attaching the harrow B, to the plough, in the manner herein described and represented; that is to say, attaching the long arm C, at K, anterior to the coulter and the short arm *a*, in the rear of the sheath, in the manner and for the purpose set forth. JACOB STROOP.

No. 6563.—*Centripetal Press.*

What we claim as new and of our own invention and desire to secure by letters patent of the United States, is the application of a plurality of pressing blocks *g g*, which, with the exception of the bottom and top, enclose on all sides the material to be acted on, and which blocks are so constructed as to allow of their lateral compressing action when moved in the compound direction herein described by a like number of wedges *d d*, or with any analogous or equivalent device through which any competent power can act to force the blocks *g*, with a simultaneous compound and centripetal motion that concentrates the pressure on a plurality of surfaces of material, to give the material a required form or degree of pressure, substantially as described and shown.

JAMES E. SERRELL.
DAVID SMITH.

No. 6564.—*Improvement in Cooking Stoves.*

What we claim as our invention and desire to secure by letters patent, is making the lower flue (*f*,) under the oven elevated at the outsides, formed between the bottom and the bottom oven plates B and A, as herein described.

WM. E. BLEECKER.
HENRY BLEECKER.
SAM'L D. VOSE.

No. 6565.—*Improvement in Keyed Musical Instruments.*

What we claim as our invention and desire to secure by letters patent, is—

First. The selectors *k*, cords *h i*, and connectors *a g b f*, combined with the valves *v*, and the finger keys of the common key board, substantially in the manner and for the purposes set forth.

Second. The so combining a system of pedals equal in number to the number of keys or scales to be played in, with the mechanism by which each finger key is connected with the valve and pipe of the desired scale, that on putting down the pedal belonging to any scale it shall at once attach to the finger keys usually employed in playing that scale upon the common organ, the valves of the pipes truly belonging to it, the scale, and at the same time raise the pedal that was before down and detach the valves which are not wanted.

Third. The pedals *p*, combined with the pulleys *a a*, and *b b*, and with the selectors *k*, in the manner and for the purpose set forth.

JOSEPH ALLEY.
HENRY W. POOLE.

No. 6566.—*Improved manufacture of Bags and Sacks.*

What I claim, therefore, as my invention, is the producing a new manufacture of bags by weaving together two or more warps above, and two or more below, to form two cloths, when the weft is carried around from the one to the other at one or both sides, to unite the two cloths, substantially as herein described, in combination with the weaving of the two cloths together at given points, to unite them by weaving together all the warps at given distances, for forming the closed sides or ends of bags, substantially as described. WM. B. CARLOCK.

No. 6567.—*Improvement in Machines for cutting Veneers from cylindrical blocks.*

What I claim as my invention, and desire to secure by letters patent, is the reciprocating saw carriage, in which the saw is operated by a belt from a driving pulley on the main frame, and passing around a guide pulley on the permanent frame, and the guide pulleys on the carriage, substantially as herein described, in combination with the carriage which carries the block to be sawed, and which has an intermittent motion towards the saw, derived from the reciprocating motion of the saw carriage, substantially as herein described.

I also claim the combination of the apparatus for giving the advancing motion of the block towards the saw with the apparatus which gives the rotating feed motion to the block, substantially as herein described; but this I only claim when the two are connected together, and derive their motions one from the other, and when the connection between the two is adjustable to vary their relative motions, substantially as described.

I also claim the combined apparatus for advancing and rotating the block, in combination with the reciprocating saw carriage, by the means substan-

tially as herein described, when the method of operating the carriage is adjustable to various lengths of blocks, and when the said connections between the carriage and the advancing and rotating apparatus are adjustable substantially as described. BENJ'N S. STEDMAN.

No. 6568.—*Improvement in machinery for jointing Staves.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the clamps for holding and presenting the stave, with a turning spindle by means of a hinge, or other turning joint, substantially as described, for the purpose of presenting the two edges of the stave alternately to the action of the shaving wheel without removing it from the clamp, substantially as described. LEWIS S. CHICHESTER.

No. 6569.—*Improvement in Winnowing Machines.*

Having thus fully described the nature, construction, and operation of my invention, what I claim therein as new, and desire to secure by letters patent, is giving rocking, vertical, and longitudinal motions to the lowest or second separating and curved riddle b', and screen c', pendent thereto by means of a mover and guide curved, attached and supported as described, or any equivalent device, operated in an equivalent manner.

Second. I also claim curving the second separating, or lowest riddle b', having its concavity upwards, in the manner and for the purpose described.

Third. I also claim deriving the vertical and vibrating motions given to the feeder m, chaff riddle, apron, and first separating riddle from the mover and guide v, of the second separating and curved riddle b', and screen c', as described, or in any equivalent way. J. W. FISK.

No. 6570.—*Improvement in Regulators for self-acting Mules.*

Having thus described my invention, that which I claim as new, is the regulator, constructed and made to operate substantially as above described, the same consisting of the combination of the weighted centrifugal lever e, the lever pawl, or click h, the ratchet wheel k, its cam l, and the lever n, applied together, and to the main driving shaft A, and the slide V, of the twist cam U, essentially as above specified.

And, as auxiliary to the above, I claim the second centrifugal weighted lever r', and the ring t, and retractive spring in combination therewith, the same being for the purpose above explained.

EBENEZER C. SANGER.

No. 6571.—*Improvement in Windmills.*

What we claim as our invention, and desire to secure by letters patent, is the horizontal expanding and closing sails or wings, as applied for the purpose of propelling machinery by wind or water, in combination with the mode by which they are regulated, as described in the foregoing and shown by the drawings.

EMORY GORE.
EMERSON GORE.

No. 6572.—*Improvement in live Spindles and Fliers.*

Having now described the nature and object of our said improvements, together with the mode of carrying the same into practical effect, we would remark, in conclusion, that we are aware that a top-bearing for spindles has been used, although not in the manner or combination in which we employ it. We do not, therefore, claim the use or employment of a top-bearing except for spindles formed or constructed as above described. But we do claim as our invention the construction and application (to the preparation and spinning of cotton, &c.,) of a live spindle formed in two parts, as above described, and having the flier permanently fixed to the upper part thereof. The upper part of the said spindle being supported in a fixed bearing, and so constructed and arranged as to allow it (when disconnected from the lower part and raised,) to be held at an angle whilst doffing the full bobbin, substantially as described.

WILLIAM MACLARDY.
JOSEPH LEWIS.

No. 6573.—*Machine for Contracting the Circumference of Wrought Iron Bands.*

What I claim as my invention and desire to secure by letters patent, is a machine for contracting by compression, the circumference of every variety of wrought iron bands, wagon tires, &c., and for compressing and shrinking the same, as herein described, thereby dispensing with cutting and welding.

WM. MASSEY.

No. 6574.—*Improvement in Washing Machines.*

What I claim as my invention and desire to secure by letters patent, is the combination of the rockers B, with the dasher E, and grooves G G, in the manner and for the purpose herein described.

THOMAS KING.

No. 6575.—*Improvement in attaching Buckles to Suspenders, &c.*

What I claim as my invention and desire to secure by letters patent, is the method herein described, of attaching buckles, loops, &c., to elastic or other goods, by means of my clasp, which I now particularly use for attaching buckles and loops to springs for vests and pantaloons, using in its construction any metallic plate most suitable for the purpose.

JOHN ABERNETHY.

No. 6576.—*Improvement in Bee Hives.*

I do not claim to be the original inventor of a bee hive in which the bee boxes are surrounded by an external case; but what I do claim, is the mode of forming and closing the entrance for the bees, on opposite sides of the hive, by means of a recessed or grooved lighting or bottom board H, moving in grooves or otherwise, so as to operate in the manner and for the purpose described; the rectangular slides L, having projections at one end, and inserted through openings in opposite sides of the case, and moving in grooves in the lower edges of the front and back of the same, for retaining the bottom board in its place when dropped, to form an entrance, and for horizontally moving back and forth to regulate the space of ingress and egress for the bees.

GEORGE WHEELER.

No. 6577.—*Improvement in Washing Machines.*

Having thus fully described my improved washing machine, what I claim therein as new, and desire to secure by letters patent, is the cleansing of cloths or clothing by the combined action of conducting and pressure rollers, with

forced jets of suds or water, substantially in the manner herein set forth, not intending, however, to limit myself to the precise mechanical arrangement and combination of parts for effecting this object, as herein described and represented, but shall vary the same as I may deem expedient, whilst I attain the same end by substantially the same means.

LEWIS W. COLVER.

No. 6578.—*Rotating Disk, Bolt and Rivet Machine.*

Having fully described my machine, its application, and the contemplated uses and means of using the same for making blank screws and rivets, and heading and nicking screws.

The previous paragraph referring to a lock up, was inadvertently omitted in the original papers, but was added while the papers were pending examination; however, I have concluded that as such part is indispensable to the alternating motion, the claim of such motion is sufficient, without claiming the device by which the disk is stopped, or caused to rest; hence I do not claim such device.

What I claim as my invention and desire to secure by letters patent, is the arranging a set of dies upon a disk, or any equivalent thereto, equidistant from the axis of the disk, and from each other, so that by giving to the disk an intermittent progressive revolving motion, a die may be brought to each of the several places for receiving the several actions of feeding, heading, and discharging simultaneously (while the disk remains at its rest or lock up) and also cuts off a rod at the time of its revolving (or progressive motion) when the disk and dies are combined with any apparatus for heading and discharging rivets, &c.

Second. I claim the combination of a disk of dies, having an intermittent progressive revolving motion, with an apparatus for heading rivets and such like articles, whether the latter be constructed in the precise manner described, or by any equivalent mechanism that will produce a like result.

Third. I claim the combination of a disk of dies, having an intermittent revolving motion, with an apparatus for knocking out or discharging rivets from the dies.

Fourth. I claim any common and well known feeding apparatus, or any equivalent thereto, combined with a heading and discharging apparatus, and a disk of dies having an alternating or intermittent revolving motion, for the purpose of conveying the dies from one position to another, as required, the machinery herein described being applicable and competent to perform the several operations, when fed with wire or rods, as set forth.

Fifth. I claim the use of the several hammers to give several blows upon the same rivet, and for making screws, as well as the planing process of nicking as applied to a revolving disk of dies in combination with the heading, feeding, discharging, and other apparatus and operations of the machine, all of which are herein before described and set forth.

JACOB G. DAY.

No. 6579.—*Improvements in Machinery for picking Waste.*

I do not claim as my invention, the use of rollers or cylinders, with points or cutters affixed thereon, for the purpose of reducing woollen, cotton or other material into fragments; but I do claim—

First. The shape and form of the pickers used in my machine, as above described, as being peculiarly calculated to separate the threads of the material subjected to them, without injuring them and breaking their fibres to such an extent that they become unfit for carding and spinning.

Second. The combination and arrangement of the whole machine with the relative action of the cylinder and roller and whipper, to and upon each other, by which the material passing through the first feed roller is by its relative rate of motion compared with that of the larger cylinder, and also the relative arrangement of the teeth of the rollers, steadily and properly fed to the action of the pickers of the large cylinders, and at the same time held firmly to ensure the due action of the pickers, and by which also the second roller is made to seize the unfinished fragments that may be dropped from the first roller, and subjects them to the action of the pickers, in a similar manner to the operation of the first rollers, so that the whole substance of the supplied material is thoroughly picked into long fibres and prepared for carding and spinning into thread.

Third. I claim as my improvement in waste picking machines, the application of picker cylinders, constructed and arranged to operate together, substantially as herein set forth and described, having teeth made in the manner and form set forth.

JOSHUA BAILEY.

No. 6580.—*Improvement in Circular Saw Mills.*

I do not claim making the saw plate in sections placed close together and attached to the periphery of a head or collar, as that has heretofore been done in saws for veneers and other analogous purposes.

First. But what I do claim as my invention, and for which I solicit letters patent, is making the plate of the saw in sections, whose inner angle rests upon the shaft, and is secured to the rings and collar, substantially in the manner described, the radial edges of adjacent sections being separated from each other far enough to admit of the free expansion of the metal from heat, without meeting, but connected by means which do not prevent this expansion, whereby the warping or buckling which invariably occur in solid plates, or those whose sections are in contact from partial heating, is effectually prevented, while at the same time the compound sectional plate thus arranged, possesses sufficient strength and firmness for all practical purposes.

Second. I likewise claim the method herein described, of preventing and arresting the vibrations in the saw plate, by causing it to pass between cushions, bristles or other elastic surfaces, arranged as herein described, or in any other substantially similar manner.

DAVID PHILIPS.

No. 6581.—*Improved Arrangement of the Sections in a Life-preserving Hammock.*

What I claim as my invention and desire to secure by letters patent, is making the hammock in three tubular sections, whether each section is composed of one or more tubes, each section being provided with an inflating and disinflating tube, so that when the hammock is used as a life-preserver, that the centre section may be disinflated, in whole or in part, thus forming a boat and retaining the occupant in his position, as herein set forth.

SAM'L J. SEELY.

No. 6582.—*Improvement in Brick Presses.*

Having fully described the character, construction and operation of our rotary brick making and brick compressing machine, we wish it understood that

we do not claim the invention of shafts A and L, cog wheels B and K, trunnel head C, pulleys O and Q, bands P R b and c, separately; but what we do claim and desire to secure by letters patent, is the combination of the mud box and moulding apparatus, as herein described, consisting of a plunger H, to which a cutter U, is affixed, and connecting therewith the horizontal feeder V, as above fully set forth. We also claim in combination with the above parts, the compressing apparatus adapted to this machine for compressing bricks, and consisting of the press plate M, and press brick lever $q\ q\ p$, constructed and operating as above set forth.

WILLIAM B. WALDRAN.
GODFREY HARGITT.

No. 6583.—*Improvement in Mills for Grinding.*

Having thus described the construction and operation of my improved grinding mill, what I claim therein as new and desire to secure by letters patent, is the combination of two or more revolving oscillating cylinders, arranged and operated substantially as herein described, for the purpose of grinding grain and other substances.

I likewise claim the manner herein described of preventing the cylinders and the journals of their axes from becoming unduly heated, by keeping a constant current of air circulating through them by the action of the oblique lips of the radial apertures in their ends, as herein described.

THOS. A. CHANDLER.

No. 6584.—*Spring and Tackle Sash-Stopper.*

What I claim as my invention, and desire to secure by letters patent, is the application of the spiral spring D, and also pulleys E and F, applied and operating substantially as herein described, for raising and lowering window sash in windows.

JOHN W. HOFFMAN.

No. 6585.—*Improvement in Pressing Bonnets.*

I am aware that bonnets have been pressed by machinery and the application of lever power to the iron box containing the heated core upon a hat block turned by a crank axle, and therefore I do not claim this as my invention in this application; but what I do claim as my invention and desire to secure by letters patent, is—

First. The combination of the suspended core box E, constructed as aforesaid, with a smooth steel pressing plate fastened to its under surface, tribranched pressing bar H, curved suspension and lifting springs F, crane G, adjustive connecting rods L, swivelled bow X, and the adjustive treadle K, constructed, arranged and operated in the manner and for the purpose herein fully set forth.

Second. I also claim constructing the suspended box E, to receive the core S, in the manner and for the purpose herein set forth, irrespective of the parts to which it is suspended and connected.

Third. I also claim the combination of the pressing iron c, slotted lever b, key e, jointed connecting rod a, and perforated arm f, to which the lever is connected with the table A^1, to which the horizontal perforated arm f, is secured, for pressing the tip of the bonnet, whilst on the roller B, of the crank shaft D^2.

C. C. DOW.

No. 6587.—*Improved Window Shutter Fastener.*

Having described in the foregoing specification the manner of constructing, mode of application, and the operation of my invention or improvements, I now explain the nature or that part which I claim, to wit:

I do not claim the fastening or locking of the window sash, when used separately; but what I claim as my invention and desire to secure by letters patent, is the combination of the pin c, clasp D, and slide bolt E, arranged, as described, with the sash when fastened, so that the clasp cannot be raised from the pin, nor the sliding bolt from its catch, as long as the sash is fastened, thereby securing the shutters at top and bottom, and entirely preventing their being loosed, by boring through the shutter, as herein described and represented.

JACOB STROOP.

No. 6588.—*Improvement in Portable Cot Bedsteads.*

Having thus fully described the construction and manner of using my portable cot, what I claim as my invention and desire to secure by letters patent, is the construction of a folding cot bedstead, as described; that is to say, the folding legs B, the hinges H, combined with connecting support A, and thumb screws C, C, in the manner and for the purpose set forth.

ABR'M M'DONOUGH.

No. 6589.—*Improvement in the Arrangement and Method of Working the Valves of Auxiliary Engines for Feeding Boilers.*

What I claim as my invention and desire to secure by letters patent, is the combination of the valves n and o, the cross head m, the valve rod P, and the hollow piston rod L, arranged in the manner and for the purpose herein described.

I also claim the mode herein described, of working the valves n and o, by means of the plate spring r.

RUFUS PORTER.

No. 6590.—*Improvement in Machinery for Spinning Cotton.*

What we claim as of our own invention and desire to secure by letters patent, is the continuous and unintermitted spinning of "slack twisted yarns," similar to and of the kind heretofore only spun upon mules and like machines, upon the stationary spinning frame, by passing the said yarn directly from the front roller upon the point of the spindle, without any intervening "guide wire" or "guide," and without changing the relative positions of the rollers and spindles, as set forth and described herein.

CHARLES R. TISDALE.
JAMES KEANE.
THOMAS KEANE.

No. 6591.—*Improvement in Wheat Cleaning Machines.*

Having thus fully described my improvement in the machinery above named, what I claim therein as new and for which I desire to secure letters patent, is the employment of the leather covered cylinder, in combination with the leather covered spring concave, constructed substantially as above described, for removing rat dirt and other substances from wheat, as herein set forth.

DAVID L. EWING.

No. 6592.—*Improvement in Ox-yoke Fastenings.*

I claim the construction of the curved arms, as formed according to the above description, so as to embrace with their front parts the bow, the rear parts being so shaped as to form a thumb and finger piece, by which the grasp of the arms may be released, together with the spring by which the arms are kept closed.

I claim the *pin*, as a whole, with the entire combination of pin proper arms and spring, as set forth in the above specification.

ANDREW HOTCHKISS.

No. 6593.—*Improvement in Cutting, Crushing and Grinding Vegetables.*

What I claim as my invention, and desire to secure by letters patent, is th adjustability of the cylinder *d*, and its parts, as shown in figure 6, for aidin the feeding, in combination with the cutting and grinding apparatus with said cylinder, as set forth.

LUTHER B. FISHER.

No. 6594.—*Improvement in Lounge and Chair combined.*

What I claim as my invention and desire to secure by letters patent, is t arrangement and combination with each other of the back, side, arms, a forward supports of the arms of the chair for folding up, when the instrume is to be used as a bed.

I also claim the construction and use of the double inclined plane K, for the double purpose of a pillow to the lounge, and for a writing de as described and represented.

ABNER T. LINIKEN

No. 6595.—*Method of increasing the effective length and cleansing Boi Flues.*

Having thus fully described my improvement, I wish it to be underst that I do not claim forming a spiral flue within a steam boiler, as that already been done; but what I do claim as my invention and for which I sire to secure letters patent, is spiral partitions, forming a spiral flue wi the flues of a steam boiler, substantially as described; said thread b affixed to a shaft, independent of the flue, so that it can be made to rev to scrape the flue and clean it when it gets foul.

ABNER CHAPMA

No. 6596.—*Improvement in Pump Valves and their arrangement.*

Having thus described my improved pump and its operation, what I as my invention, and desire to secure by letters patent, is connectin valve, substantially in the manner and for the purpose herein set forth.

I also claim making the wings of valves of a spiral or screw form, sul tially in the manner and for the purpose herein set forth.

THOMAS THATCHI

No. 6597.—*Improvement in Winnowing Machines.*

I do not claim as my invention the application of a fan blast to c grain; but what I do claim as my invention, and desire to secure by

patent, is the combination of a wind chest D, and adjustable register E, with a separating box B, substantially in the manner and for the purpose herein set forth.

ABRAHAM STRAUB.

No. 6598.—*Improvement in Smut Machines.*

What we claim as our invention, and desire to secure by letters patent, is:

First. The combination of the beaters I, ribs H, and teeth J, with the circular disc F, constructed, arranged, and operating in the manner and for the purpose herein set forth.

We also claim the combination of the perforated or reticulated curbs let into and surrounding the central air holes of the top and bottom of the stationary cylinder, in combination with said stationary cylinder, made in the manner herein described; said reticulated curbs operating in the manner herein set forth, by which free currents of air are produced through the central openings of the top and bottom of the cylinder to the centre thereof, and thence radially from the cylinder through its sides, carrying off the smut immediately on its being separated from the grain, and before the smut can have time to descend and again become mixed with it, as herein described.

ALBERT BUELL.
THOMAS BROWN.

No. 6599.—*Improvement in Vegetable Cutters.*

Having thus fully described my improved apparatus for cutting vegetables, what I claim therein as new, and for which I desire to secure letters patent, is constructing the hopper in the manner set forth, by means of the combination of inclined arms and spreading sides, in the manner and for the purpose set forth, and combining it with and revolving it over a series of stationary knives, as set forth.

WYLLYS AVERY.

No. 6600.—*Improved Deflector for Spark Arresters.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the stationary hollow trumpet-shaped pendent button D, and stationary curved cap D′, with the dome B′, constructed, arranged, and operating in the manner and for the purpose set forth, by which I am enabled to prevent the escape of the sparks with the smoke; the effect of the steam from the exhaust pipes entering the hollow button being threefold: first, to force the sparks downward by coming in contact with them at the circular passage (*d*;) secondly, to extinguish them; and thirdly, to increase their specific gravity, and thus cause them to fall immediately to the bottom of the cinder box C^3.

SAMUEL SWETT.

No. 6601.—*Improved Whiffletree Hook.*

Having thus fully described the manner in which I construct my improved hook and head or ferule, for the whiffletrees of carriages, what I claim therein as new, and desire to secure by letters patent, is the manner herein set forth of combining the hook with the ferule so as to admit the former to turn round in the latter when the cock-eye or tug is to be inserted or removed; the respective stops and the auxiliary hook being arranged substantially in the manner herein set forth, so as to prevent the accidental escape of the tug from the hook.

A. N. GRAY.

No. 6602.—*Improvement in Calculating Machines.*

What I claim as my invention and desire to secure by letters patent, is the combination of the slides B B, with the indices E E, and the bars F G, in the manner and for the purposes set forth.

S. S. YOUNG.

No. 6603.—*Improvement in making Elevator Tubes for Lamp Wicks.*

What we claim as our invention and desire to secure by letters patent, is the manner of making the elevators of tubular lamp wicks, by combining a spiral, produced by coiling a band or ribbon of metal into a cylindrical figure, with another band of metal formed into a similar spiral, but so as to leave a spiral slot or opening between its contiguous edges, the one spiral being placed within the other, and the two breaking joints with each other, and united to form a tube spirally grooved or screw shaped either within or without, or both within and without, at the same time, in the manner and for the purposes herein set forth, not intending to limit ourselves to the exact arrangements herein set forth; but to vary them at pleasure, while we attain the same ends by means substantially the same.

ROBERT CORNELIUS.
C. WILHELM.

No. 6604.—*Improvement in Casting Types.*

We do not intend to limit our invention to the casting or founding of any particular form or shape of types, or to the founding or casting of types alone, as it may not only be adapted to the manufacture of types of various shapes, but of various other things or matters usually made from metal or other material when in a melted state.

What we claim as our invention, is a combination of machinery made up of the following elements or their mechanical equivalents, the same consisting of the endless chain and its wheels, the series of mould sections applied thereto, and having moulds made in them essentially as described, one or more plates or walls K L, (having one or more air escape holes *c*, made through them,) and the vessel M, or other suitable substitute, all made to operate together substantially in manner and for the purpose as above specified.

JOHN BACHELDER.
SIMON D. DYER.

No. 6605.—*Improvement in Seed Planters.*

What I claim as my invention and desire to secure by letters patent, is the making use of open inclined conductors J K L, for conveying the grain or seeds from the grain-box to the ground, when combined with the series of gates *d d*, and the moveable adjustable side of the grain box, for regulating and governing the discharge of the seeds or grain therefrom, substantially as herein represented and described.

I also claim the manner of arranging and combining the series of reciprocating and vibrating stirrers *b* and *a*, with each other within the grain box, substantially in the manner and for the purpose herein represented and set forth.

I also claim the combination of the reciprocating and vibrating stirrers *b* & *a*, with the continuous discharging aperture in the grain box, and the regulating gates *d d*, connected therewith, and with the series of inclined open seed or grain conductors J K L, substantially in the manner herein set forth.

R. H. SPRINGSTEED.

No. 6606.—*Improvement in Hill-side Ploughs.*

Having thus fully described my invention, what I claim therein as new, and for which I desire to secure letters patent, is constructing a hill-side plough, substantially in the manner described, by making the entire land side stationary, and combining therewith two mould boards revolving on a shaft above said land side, so as to turn a furrow on either side when brought into position by means of a crank or other analogous device near the handles of the plough.

ALLEN ELDRED.

No. 6607.—*Improvement in Sofa Bedsteads.*

What I claim as my invention and desire to secure by letters patent, is the construction of a seat, or bed, placed under the ordinary seat of a sofa, couch, lounge, or any other suitable piece of furniture, which will revolve on suitable pins or pivots A, of wood or metal at each end, working in slots B, as described; said seat or bed, to be hinged to the ordinary seat in such a manner that when the ordinary seat is drawn or lifted forward, the under seat or bed will revolve and come on a level with the ordinary seat, which combined, will form a level and good sized bed.

EDWIN B. BOWDITCH.

No. 6608.—*Improvement in Connecting Hubs with Axles.*

I do not claim as my invention securing the hubs of carriage wheels to their axles by means of a catch or segment collar fitting in a groove of the hub or pipe box, as this has long since been known; but what I do claim as my invention and desire to secure by letters patent, is securing the hub of a carriage wheel to its axle by means of a catch or segment collar fitting in a groove of the hub or pipe box, in combination with the spring connection of the said segment collar, and the pin or other projection passing down below the axle, substantially as described, to admit of disconnecting the collar in lifting up the wheel, as described.

JUNIUS FOSTER.

No. 6609.—*Improvement in Apparatus for unloading Carts, &c.*

What I claim as my invention and desire to secure by letters patent, is the combination of the upper or tilting frame B, with the lower frame A, the latter being either stationary or on wheels. I furthermore claim the central lever *l*, with its check and hook *k*, in combination with the stancheon rod *n*, the cam *o*, and the stancheons *p*, and said lever, check and hook, stancheon-rod, cam and stancheons, in combination with the tilting frame B, being mounted on a stationary frame, as represented in figures 1 and 2, or on wheels, as shown in figure 3; the construction or arrangement, and operation of all of which being substantially in the manner and for the purposes herein above described.

CHARLES DOWNER.

No. 6610.—*Improvement in Metallic Boot Heels.*

I do not claim filling a cased heel for shoes or boots with India rubber, which projects beyond the case, to form an elastic tread, nor the employment

of either India rubber or other springs to give elasticity to the heel, when a metal tread is not used; but what I do claim as my invention and desire to secure by letters patent, is making a metallic tread for the heels of shoes and boots, separate from but secured within the casing of the heel in such a manner that it shall be free to change its position to accommodate itself to the inequalities of the surface of the ground, whereby it wears more evenly, and is less fatiguing to the foot than a rigid heel, in the manner set forth.

PATRICK S. DEVLAN.

No. 6611.—*Improvement in Ploughs.*

Having thus described and represented my construction of plough, what I claim as new and desire to secure by letters patent, is—

First. The manner of forming the bed of a plough, with a socket for the admission of the handles, and securing the mould board to the bed, (A,) by means of the knob (b); the one wedge, (d,) serving the double purpose of retaining the mould board and lower ends of the handles in place, in the manner described and represented.

Second. I also claim the so constructing the brace C, as to make a firm rest and fastening for the handles, thereby rendering an effectual and simple fastening for the handles of a plough, the whole being arranged substantially as set forth.

JOHN RICH.

No. 6612.—*Improvements in Moveable Breeches for Fire Arms, and the Locks and Appurtenances of the same.*

What I claim as new and desire to secure by letters patent, is forming the breech of a gun, and its breech piece or pin with sectional screws t and t', cut therein for the purpose of speedily opening the breech for swabbing, depositing the load, and readily closing it again, when the gun is to be discharged, as herein set forth.

Second. I also claim, in combination with a sectional screw breech piece, the hinged support (G,) the slot (Y,) and lever (L,) whereby the said breech piece is easily moved into and out of place in closing and opening the gun, for the purposes herein set forth.

Third. I also claim forming the gun lock in such a manner that the hammer rod and the percussion rod shall be in separate pieces, laying axially within the same barrel, whereby the coiled main spring is made to urge the hammer rod against the head of the percussion rod to discharge the piece, and the recoil spring on the percussion rod is made immediately to draw back and hold the valve which closes the interior of the lock against access of smoke and gases, as herein set forth.

Fourth. I also claim, in combination with a gun having a dissecting screw breech, the flanged shield, (s,) through which the cartridge is made to pass into the chamber over the dissected screw, without danger of being broken by the ends and edges of the threads, as herein set forth.

Fifth. I also claim the perforated point or nipple on the percussion cap, for penetrating the enclosing material of the cartridge, and insuring the discharge of the gunpowder, when the percussion is given in the rear of the cartridge, in the manner herein set forth.

Sixth. I also claim, in combination with a rammer for charging guns at the breech, the projecting central point (n,) whereby the cartridge, in being driven to its place in the chamber, is perforated at its base to receive the point of the percussion cap, herein described, for the purpose of insuring the ignition of the gunpowder, as set forth.

Seventh. I also claim the enlargement (x,) near the shoulder (s,) of the rammer, whereby the shield, through which the cartridge has been rammed, is made to adhere by friction to the rammer, and to be drawn out of the breech of the gun without requiring a separate operation for taking it out. And I wish it to be understood that in these claims I shall not confine myself to the exact arrangement of parts herein described, but shall vary the same at pleasure, while I attain the same ends by means substantially the same.

B. CHAMBERS.

No. 6613.—*Improvement in Machines for Pegging Boots and Shoes.*

What I claim as my invention and desire to secure by letters patent, is the manner herein described of simultaneously punching one or more holes in the leather, and driving pegs into others previously made, by means of the awls and punches, arranged as herein described, or in any other substantially similar manner.

Second. The manner of supplying the pegs to be driven by the punches, by conveying them from the hopper in a channel which turns them from a horizontal to a vertical position, with the points downwards, ready to be driven into the holes punctured in the leather for their reception.

Third. The combination of the guide point t, with the set screw d, for regulating the distance of the pegs from each other, and from the edge of the sole.

Fourth. The manner of raising the holder by means of a thumb lever, whether arranged and operating as herein described, or in any other substantially similar manner.

Fifth. The combination of the bent lever, connecting rod and pushers, for the purpose of driving the pegs out of the hopper into the channels which convey them to the punch holes.

And, generally, I wish it to be distinctly understood, that I do not intend to limit myself to the precise form and arrangement of parts herein described and claimed, but expressly reserve to myself the right to modify the same in any way that I may deem advisable, so that I do not change the essential character of the invention.

JAMES LA DOW.

No. 6614.—*Improvement in equalizing the action of Gearing in Horse Powers.*

What I claim as my invention and desire to secure by letters patent, is equalizing the strain and lessening the force of shocks upon a train of cog wheels, by connecting the wheels with their shafts by springs, substantially as herein set forth.

CHARLES CAPLES.

No. 6615.—*Improvement in the process of hardening Metals.*

I do not claim hardening steel or iron by immersing it, in whole or in part, in a current of water, nor do I claim suspending the article to be hardened in air, and causing a jet of water to impinge against it, as these methods are known; but what I do claim, is hardening steel or iron by immersing it below the surface of and in water, and then causing one or more jets to play through the body of the water and against the metal, or part thereof to be hardened.

ASA WHEELER.

No. 6616. — *Improvement in the Valves of Rotary Engines.*

Having thus fully described my improved prime mover, what I claim therein as new, and for which I desire to secure letters patent, is the sliding valve, constructed as herein described, with an exhaust port therein, which is stopped by the piston while it is opening the valve, as above set forth.

J. P. ROSS.

No. 6617.—*Improvement in Signal Lanterns.*

What I claim as my invention, and desire to secure by letters patent, is the revolving cylinder of colored and plain glass, arranged in a portable signal lantern, in the manner and for the purpose herein set forth.

GEORGE CALLARD.

No. 6618. — *Improvement in Machines to beat and brush Carpets.*

What I desire to claim as my invention, is the employment of dusters or beaters, as herein described, for dusting or cleansing carpets and other fabrics of the same sort; not wishing however to limit myself to the exact method of employing the power.

WILLIAM PETERS.

No. 6619. —*Improvement in Paring, Coring and Slicing Apples.*

Having thus fully described the construction and also the mode of using my machine, what I claim as my invention and desire to secure by letters patent, are the following particulars:—

First. The arrangement of a segment wheel attached to a shaft, said shaft having a socket with projecting arms for the insertion of the knife handle, said segment wheel meshing into a bevel wheel formed on the driving wheel which said bevel contains a bare space and wide cog for the purposes herein before described, the said shaft having a swinging or vibrating weight attached thereto, for the use above stated.

Second. The arrangement of a sliding corer for coring the apple, and for detaching it from the fork, and the guide for dropping the apple from the coring tube, as described.

Third. A slicing apparatus, with cutters or slicers of tin or steel, of the form and arrangement as herein described, placed under the foundation, and connected with the driving wheel aforesaid, so as to perform the operation of slicing at the same time with that of paring.

Fourth. The arrangement of paring, coring and slicing, combined in the same machine, as described; and I make no other claim.

JULIUS WEED.

No. 6620.—*Improvement in Ploughs.*

Having thus fully described my improvements in the plough, and the construction and connection of the several parts thereof, what I claim as my invention, and for which I solicit letters patent, is—

First. The exclusive use of a mould board composed of two sections or parts J L, the lower section or part J, being secured to the land side by the trapezoidal shaped plate O, and extension or bed A′, upon which it rests, the upper section or part L, being adjustive and joined thereto by projecting pivots L^1 L^2, upon which it turns, and adjusted and secured by means of a hook bar N, fixed to the land side B, the whole being constructed and arranged in the manner described.

I also claim the manner of securing and attaching the land bar I, to the land side, as described and represented.

I likewise claim the combination of the adjustive weed cutter and leveler F, with the land side and adjustive sustaining wheel E, as described.

JESSE WARREN.

No. 6621.—*Improvement in Apparatus for Filtering Water, &c.*

What I claim as my invention and desire to secure by letters patent in my improved apparatus for purifying Mississippi river water, is the combination of the settling chambers and filtering compartments, substantially in the manner herein set forth, to wit; the first settling chamber A, being the reservoir or head, extending under the first filtering compartment, and the remaining settling chambers being nearly in the form of an L, with the vertical portion *p*, of each chamber for the passage of water situated between two filtering compartments (B,) and sufficiently large to admit of easy access for cleansing, and its horizontal portion *n*, extending under one of the said filtering compartments, by which arrangement the water will filtrate upwardly from the reservoir A, through the first filtering compartment B′, and flow thence into the vertical portion *p*, of the next settling chamber, in which it will descend into the horizontal portion *n*, of the same, and thence will ascend through the second filtering compartment, and thus continue its course through the entire series of settling chambers and filtering compartments, till it reaches the pure water reservoir C, at the opposite end of the apparatus; by which combination and arrangement free access can be had to the settling chambers and filtering compartments, for the purpose of cleansing them, substantially as herein set forth.

Not intending by the above claim to cover the general principle of the combination of a series of settling chambers with upwardly filtering compartments, the gist of my invention consisting in such an arrangement and combination of settling chambers and filtering compartments, as will give free access to both of them, for the purpose of cleansing them of foul deposits, substantially as herein set forth.

JUSTIN MULHERN.

No. 6622.—*Improvement in Bee-Hives.*

I do not claim to have invented the use of a screen in any of the forms in which it may have been applied to bee-hives merely, but what I claim and desire to secure by letters patent as my invention, is a sash door with a woven wire screen, in combination with projecting parts of the hive, so constructed as to form a recess or space in front of the hive of sufficient size to accommodate a cluster of bees according to their habits of hanging outside the hive, and so that they may be enclosed and protected, whether outside or inside of the hive, by closing the door at night from the moths, as herein specified.

JOSEPH A. DUGDALE.

No. 6623.—*Improvement in Salting Meats.*

Having thus fully described my invention, I wish it to be distinctly understood that I do not claim any particular form of apparatus, as that can be greatly varied and modified; but what I claim as new and desire to secure by letters patent, is rotating or otherwise moving as described, the flesh of animals while in contact with salt or other substances with which it is de-

sired to impregnate it, thereby accelerating or aiding their incorporation or mixing more readily than can be done by hand.

THOS. DAVISON.

No. 6624.—*Improvement in Gas Lamps.*

I do not claim as my invention a generating tube or vapor burner separately considered, but what I do claim as my invention and improvement in lamps for producing light by burning the vapor or gas generated within itself in the manner of gas burners, and which I desire to secure by letters patent, is—

First. The mode of regulating and extinguishing the light when required, by means of a valve formed by the top of the inner cylinder G, at L, and the end or surface of the button R, attached to the head O, of the outer cylinder M, whether the several parts forming said valve be made and arranged in the manner above described, or other mode substantially the same, by which similar results shall be produced.

Second. I also claim the employment of the safety valve C D E, in combination with the guard plate, constructed substantially as above described.

Third. I likewise claim the use of the guard U, in combination with the combined burner and generator, arranged and operating in the manner and for the purpose above set forth.

Fourth. I also claim combining the generator Q R, burner M O, ring V, and guard U, in a single piece made to ascend and descend simultaneously in the manner and for the purpose substantially as herein set forth.

HORATIO G. SICKEL.

No. 6625.—*Improvement in Argand Burners for Gas Lamps.*

I claim the application of the conductor *g*, and button 3, acting in the centre of an argand burner, to conduct heat to the liquid matter in the wick below, for the purpose of making the argand burner a self-generator of the gas it consumes, substantially in the manner and with the effects described and shown.

JOHN G. WEBB.

No. 6626.—*Improvement in Gas Apparatus.*

What I claim as my invention, is the mode of washing the gas or separating the acid, the same consisting in the employment of a close horizontal vessel, and a current of water made to flow through it, as specified, and passing the gas into one end of the vessel and water, and out at the other end thereof, all essentially as specified.

I also claim the combination of a lime cistern or vessel with either the gas holder or purifyer, in manner and for the purpose as above specified, not meaning to claim the use of lime for abstracting moisture, as the same is a well known absorbent.

ANDREW WALKER, Jr.

No. 6627.—*Improvement in Blocks for Setting Hat Brims.*

I wish it to be distinctly understood that I do not claim the hollow box, nor the heater (fig. 5,) nor the method of heating the machine by the same, that being already in common use; nor do I confine myself to that particular mode of heating, as the same may be accomplished by steam or heated air, it being only necessary to dispense with the slide *f*, and making the machine steam or air tight.

What I do claim as my invention and wish to secure by letters patent, is the combination of the convex surface *a*, and the iron or metallic weight *b*, made concave to fit the convexity of *a*, as represented in figs. 1, 2, 3, and the perspective view.

S. BILLINGS.

No. 6628.—*Improvement in securing Hooks and Eyes to Tape and Dresses.*

I do not claim any improvement in the hooks or eyes themselves, whether made of round wire or flattened wire, or flattened after they are bent, excepting only the difference in their shanks, by which they are suitably formed and adapted to be attached to tape, and to the same when so attached as herein before described; and my hooks so adapted and constructed as herein before described, I call tape hooks, and when so attached to the tape, as herein before described, I call the article hook tape or crosha tape.

What I claim as my invention and desire to secure by letters patent, is the oblong loop or eyelet in combination with the hook and eye, so as to fasten them to garments by means of tape, and by me designated the "tape hook," as herein before described, and also the attaching of hooks and eyes to tape, as herein before described, so as to form the article by me designated hook tape.

CHS. ATWOOD.

No. 6629.—*Improvement in Pessaries.*

Having thus described my improved stem-pessary, I shall state my claim as follows: What I claim as my invention, and desire to have secured to me by letters patent, is forming a stem-pessary with a shield to fit around the labia, and to which the supporting straps may be connected, substantially in the manner and for the purpose herein above specified.

J. H. ROBINSON.

No. 6630.—*Improvement in Bedstead Fastenings.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the cord and slat bottom and use of pulleys, and the methods of suspending it, and also the method of straining the cord by the ratched windlass.

HENRY MILLER.

No. 6631.—*Improvement in Cleansing Bottles.*

What I claim as my invention, and desire to secure by letters patent, is the application of the apparatus substantially herein set forth, for the purpose of cleansing bottles.

M. C. CRONK.

No. 6632.—*Arrangement of Weight and Pulley for closing Gates.*

What I claim as my invention, and desire to secure by letters patent, is the application of a swivel pulley for closing a gate when the cord to which the weight is attached is fastened to the gate below the level of the said pulley, whereby it acts not only as a gate closer, but also as a support to prevent the gate from sagging, the whole constructed substantially as herein described.

WILLARD TWITCHELL.

No. 6633.—*Improved method of regulating the contraction of Car Wheels.*

What I claim as my invention and discovery, and desire to secure by letters patent, is the mode of cooling and thereby regulating the contraction of chilled

railroad car and other wheels, and pulleys with solid hubs, by the application or a stream of cold air to the hub, in the manner above described, in combination with the non-conducting case for retarding the cooling of the rim, as herein set forth.

JOHN MURPHY.

No. 6634.—*Machine for making Spiral Springs of Wire.*

What I claim as my invention, and desire to secure by letters patent, is the entire method herein described of making springs of curved character in flat or spiral form, in the manner herein set forth, namely, by forcing the wire by notched toothed wheels, or otherwise, between friction rollers, tubes, or smooth bars, so as to form a wire spring into a curved and spiral form at the same time, by means of varying the tool as described; also, the method herein set forth for varying the size of the curve by moving the operating tool by a cam, inclined plane, or any similar mechanical contrivance.

WILLIAM VAN ANDEN.

No. 6635.—*Improvement in the manufacture of Button Moulds.*

We do not claim any of the separate parts of the machine, as such, nor the use of any of the parts separately as our invention; but what we claim as our invention, and desire to secure by letters patent, is the use of the ratch wheels (r and s,) rack (i',) and lever (i,) or one or more friction rollers, rack, and lever, to produce the feeding motion, when combined with the method of holding the strip, and the alternate vibratory motion of the belts, produced by the operation of the cams, thus constituting a self-acting and self-regulating machine when the whole is constructed, arranged, and combined substantially as herein described.

JOSIAH HAYDEN
RUFUS HYDE.

No. 6636.—*Eccentric Piano Lock.*

What I claim as my invention, and desire to have secured to me by letters patent, is a piano case or trunk lock, in which the bolt is thrown out and in by an eccentric, substantially as herein above described.

PETER H. NILES.

No. 6637.—*Improvements in Locomotive Spark Arresters and Smoke Conductors.*

I claim, in combination with a deflector (c,) for directing downwards the current of sparks in a locomotive chimney, the inverted conical jacket or cullender (D,) when perforated with horizontal holes and each hole furnished with flanges which project upward, within, and downward, on the outside of said jacket, whereby the sparks are directed down into the space between the jacket and the outer case of the chimney, and are prevented from raising upward, as herein set forth.

I also claim, in combination with a horizontal chimney for locomotives, the mouth-piece or inhaler, having two upright partitions meeting in an edge or vertical line at the front, whereby the two parts of a divided current of air are made to pass around the sides of the interior chimney, and to unite beyond the opening which gives exit to the smoke or gases, in such manner as to augment the draught of the horizontal flue, while avoiding the entrance of the air to the vertical part of the chimney.

I also claim, in combination with a horizontal flue for locomotives, the moveable inhaling valves L L, which form the lateral gorges, for the purpose of creating draught within the horizontal flues, in the manner and for the purposes herein set forth, whereby the amount of draught may be increased or diminished at pleasure, whether the cars move with one or the other end foremost.

J. F. FLAGG.

No. 6638.—*Improvement in Cooking Stoves.*

First. What I claim as my invention and desire to secure by letters patent, is the mode of forming diving flues l, at the ends of the oven, and opening and closing the communication through the same, by means of the doors J J, arranged inside the oven, and connected to the outer doors I, by links or hinged plates (k,) and the swinging dampers K, operated by said inner doors J, in the manner and for the purpose herein set forth, and in combination with said flues, I claim the upper and lower horizontal flues E F, and back diving flue g, for conveying the heat around the oven, and back into the smoke pipe, as indicated by arrows in fig. 1, and herein described.

Second. I also claim the combination of the door H, on the side of the stove, with the box or draw i, inserted in a corresponding formed case at the bottom of the stove, for the double purpose of forming a return flue h, for the smoke and heat, and a receptacle for soot, &c., cleaned from the flues as described.

NICHOLAS MASON.

No. 6639.—*Improvement in forming and balancing Mill Stones.*

What I claim as my invention and desire to secure by letters patent, is the mode herein described of testing and balancing mill stones by being enabled by the means here described to observe the balance of the stone while the same is in motion, as well as at rest, and at the same time to correct the inaccuracies of its balance during the progress of construction.

I also claim the use of the machine here described, for turning off the exterior of the mill stone in finishing the same, as herein mentioned, in combination with the use of the same machine in testing the balance of the stone, as above set forth, the whole being arranged and combined substantially as herein set forth and described.

EDMUND MUNSON.

No. 6640.—*Reversible Life Boat.*

I do not intend to confine my invention to the precise shape or form of parts as exhibited in the drawings, but mean to vary or change the same in any manner and to any extent, so long as I maintain or preserve in it the same principle or novel feature claimed by me, and which renders my boat of great advantage for the purpose of saving life in cases of shipwreck, or other disaster to which navigable vessels are subject.

What I claim as my invention is the buoyant boat constructed with the opening B, and the moveable platform or floor D, placed within the same, and made to operate therein, substantially in the manner and for the purpose as specified; and as auxiliary thereto, I claim the combination of one or more thwart frames, as constructed, applied to the same, and made to operate in connection with the platform, essentially as described.

GEORGE P. TEWKSBURY.

No. 6641.—*Improvement in Self-acting Cheese Presses.*

Having thus described my invention, I claim the cross head lever E E constructed with the racks *e e*, as described, in combination with the chees table D, and the stationary racks B B, by means of the wheels W W, anc pinions K K, operated by the pinion J, in the manner herein represented, fo the purpose of elevating the cheese table, and the cross head lever, but espe cially for exerting a continual self-acting pressure upon the cheese, by the spac between the cross head and the cheese table decreasing as the cheese is bein compressed, substantially as herein represented and described.

IRA CARTER, Jr.

No. 6643.—*Improvement in Road Scrapers.*

What I claim as my invention and desire to secure by letters patent, the device (consisting of brace rods (*b*,) sliding eye bolts (*c c'*,) connectin rod (*d*,) hand lever (*c*,) and spring catch (*g*,) for changing the angle forme by the share with the line of draught) arranged and operated substantially herein set forth.

B. M. TOWNSEND.

No. 6644.—*Improvement in Rice Hullers.*

What I claim as my invention and desire to secure by letters patent, covering the rubbing cylinder and concave or other rubbing surfaces of rice other grain hullers with vulcanized India rubber, in the manner herein d scribed and set forth.

CHARLES WALKER.

No. 6645.—*Improvement in Machines for Ruling Paper.*

What I claim as my invention, is the expansion belt V, and projection in combination with the endless apron R, and the machinery for gauging a delivering the sheets of paper thereto, substantially as specified, the said m chinery being the endless aprons D and G, and gauge O.

WM. S. WILDER.

No. 6646.—*Improvement in Steam Tables.*

What I claim as my invention and desire to secure by letters patent, is combination of the hollow top and bottom of the table with the hoop, same being made and arranged substantially in the manner and for the p pose herein described.

I likewise claim making the hollow top with a recess in its under side, which to raise the stirrer while the hoop is being withdrawn, in the mar and for the purpose herein set forth.

EDWIN HILLS

No. 6647.—*Method of uniting Metallic Plates to each other.*

What I claim as my invention and desire to secure by letters patent, is mode of securing together the extremities of metallic hoop bands, to hoops or metallic plates, by making angled incisions in the same, and loc the projecting portions of metal between the lines of said incisions into other, and pressing or hammering them together, so as to form smooth faces above and below, in the manner before described.

SAMUEL PRAT

No. 6648.—*Improvement in the Process of Flouring.*

What I claim as my invention and improvement and desire to secure by letters patent, is the process of re-grinding the offal of wheat, *immediately after* it has passed from the "bolts," and putting it through lower "dusters" or "bolts," and returning the flour to the "cooler," to be re-bolted with the superfine flour, all by a continuous operation, after the manner herein before described, so as to produce three new results. 1st. To get a *greater quantity of superfine flour* out of any given amount of wheat than is now obtained by any known method. 2d. By *exhausting* the *moisture* from the grain to prevent the flour from becoming sour; and, 3dly. To *reduce* the products to *two* kinds, *superfine* flour, and a final residuum or *bran*, increasing the former and decreasing the latter or less valuable product, all as herein fully set forth.

D. P. BONNELL.

No. 6649.—*Improved arrangement of Steam Boiler and Furnace thereof.*

What I claim as my invention and desire to secure by letters patent, is giving the combustion chamber of boilers an inverted conical or pyramidal form, so as to make the area of the upper horizontal section greater than that of the lower, surrounding it with a water casing and with a gas chamber, also of increased capacity at the top, and attaching the several parts to the flat bottom of a boiler which forms the top of the combustion and gas chambers, the water casing and the flat bottomed vessel being connected with each other, and the whole forming one boiler, the several parts of which are arranged substantially in the manner and for the purposes herein set forth.

I likewise claim the injection of a jet or jets of air at the flues or passages which connect the combustion chamber with the gas chamber, for the purpose of igniting the gases and retarding their progressive motion towards the bottom of the gas chamber.

H. BOARDMAN.

No. 6650.—*Improved arrangement of Filters for Steam Boilers.*

I do not, however, intend to limit myself to the use of a series of shifting filters, as the same thing can be accomplished by reversing the arrangement, by means of a series of stationary filters, with the feed pipe and blow-off pipe so arranged with a four or more way-cock or other valves, that the supply and blow-off water can be shifted from one to the other of the series.

Nor do I wish to limit myself to the employment of the construction of filters herein above specified, as other kinds of filters may be substituted, the construction of the filters constituting no part of the invention for which I claim letters patent.

The shifting of the filters or of the direction of the water to the filters may be done either by hand or at given intervals, by being connected with the moving parts of the engine, but I make no claim to this, and, therefore, leave the means and the selection of the mode to the discretion of the constructor.

What I claim as my invention and desire to secure by letters patent, is the combination of a series of filters with the supply or feed pipe of a steam boiler, and placed at some point between the supply pump and the boiler,

substantially in the manner and for the purpose specified, whether the series be made to shift to the supply pipe, or *vice versa*.

I also claim the above combination of the series of filters and supply or feed pipe, in combination with the blow-off pipe of steam boilers, for the purpose and in the manner specified, and this I claim whether the series of filters be made to shift to the blow-off pipe, or *vice versa*, as specified.

EDMUND BLUNT.

No. 6651.—*Improvement in Covered Buttons.*

Having thus described my invention, I claim the forming of the button with its two parts, top and bottom, made of wood joined together by appropriate fitting parts in the one to coincide with the other, to secure the textile covering inside, and the shank likewise, in the manner substantially as herein described, or in any other manner substantially the same.

PETER KIRKHAM.

No. 6652.—*Improvement in Meat Cutters.*

I do not claim to be the original inventor of a machine for mincing meat on a horizontal rotating block, by means of oblique knives, having a vertical ascending and descending movement, as this is not new; but what I do claim as my invention and desire to secure by letters patent, is—

First. The use of the vibrating spring lever J, for the purpose and in the manner described and represented.

Second. I claim the use of steam for heating and moistening the cutters, as described.

ALLEN BURDICK.

No. 6653.—*Improvement in Mills for Sawing Ship Timber, &c.*

I have thus described the mode of applying the principle of my invention, which I deem the best, but it will be understood that I do not confine myself to any particular mode, as various changes may be made in the details, without varying the principle or character which distinguishes my improvements from all other things before known.

What I claim as my invention and desire to secure by letters patent, is the mode of turning saws mounted upon stretchers or otherwise, within the saw gates, by means of feathers or ribs, with the arms or parallel motions connected therewith, and operated by keys, as herein before described.

And I also claim the mode of determining the bevels of cuts to be made [illegible] said improved sawing machine, by means of a graduated semicircular [illegible] and sliding frame, as herein before described.

J. W. COCHRAN.

No. 6654.—*Improvement in the manufacture of Buttons from Straw-board.*

What I claim as my invention, and desire to secure by letters patent, is the mode or process of preparing the buttons aforesaid for the reception of a smooth coat of varnish, which process consists in removing the roughness from the surface of the buttons, after baking them a second time, by revolving them in a cylinder with linseed or other fixed oil, and again baking them until the said oil becomes dry and hard, and impervious to the varnish, as aforesaid, all substantially in manner and form as above described; which said process is peculiar to the use of straw-board in the manufacture of dead-eye

buttons, and essential in the use of that material; and whereby an equally good button can be afforded at nearly one half the cost of the ordinary paper button heretofore manufactured by me in the method secured to me by letters patent of the United States of September 23d, A. D. 1843.

ELISHA M. POMEROY.

No. 6655.—*Improvement in Fire-proof Safes.*

Having thus described our improved concrete safe, what we claim therein as new, and desire to secure by letters patent, is the manner of joining the interior to the exterior casing by bolts or rivets imbedded in the insulating cement, substantially as herein set forth, whereby it is rendered more capable of resisting the action of fire or external force applied to break it open.

We likewise claim the employment, in chests so joined by bolts, of hydraulic cement as the insulating material for fire-proof safes or chests, it being stronger when concreted than other cements heretofore used for that purpose, and therefore making a safe of superior strength and durability, especially when the same is constructed upon our concrete principle herein described.

EDWARD HALL.
JOSEPH L. HALL.

No. 6656.—*Improvement in Planetariums.*

What I claim as my invention, and desire to secure by letters patent, is as follows: I claim the arrangement of the orbit of each planetary ball, excepting those representing the earth and Mercury, in a vertical plane, in combination with overloading one side or part of said ball in such manner that the action of gravity shall operate to rotate the ball once during each revolution of it about the sun L, or in other words, preserve the parallelism of the axis of the ball throughout its entire revolution; the said improvement enabling me to illustrate the seasons at each of the planets excepting the earth and Mercury.

I also claim the method of applying the lamp so as to illuminate the globe L, the same consisting in arranging the lamp on the outside of the globe, and extending the wick tubes into and through an opening made in the globe, and around its axis of rotation, as specified.

I also claim the arrangement of the inferior planets, and the mechanism for operating them with respect to the sun and the superior planets, and their operating mechanism, the said arrangement enabling me to get the inclined motions of the inferior planets, and by so doing to illustrate the doctrine of the transits. This arrangement consists in placing the machinery by which the inferior planets are moved on the opposite side of the sun L, to that on which the other planets and their operating machinery are disposed. The vertical zodiac is so arranged that the equinoctial points are in a horizontal line, and the solstitial points in a vertical line. The "vernal" equinox being on the left, the "autumnal" falls upon the right.

The ascending node of Mercury is in the last of the sign Taurus, or in that point of the zodiac which is reached by the earth on the ninth or tenth of November. The descending node is of course at the opposite point. The machinery which operates the planet Mercury carries it across the plane of the earth's motion at these points.

I also claim the combination of mechanism by which the annual and diurnal revolutions of the earth S, are produced, and by which the parallelism of

the earth's axis during its annual revolution is preserved, the said machinery consisting of the stationary grooved zodiacal wheel and endless belt thereon, the forked arm e^2, its supporting shaft and rotating mechanism, the pulley x^2, tubular shaft w^2, pinion v^2, gear u^3, cylindrical block t^2, and shaft n^2, pulleys $r\ q^2$, and their endless band; the whole being applied to the globe S, and made to operate substantially as specified.

BENJ. O. SWAIN.

No. 6657.—*Improvement in the manufacture of Car Wheels.*

What I claim as my invention is the above described improvement in the manufacture of a wrought-iron wheel for railway carriages, viz: by contracting or compressing the tire and its lips down upon a dove-tailed rim while the tire is heated as specified, whereby the parts are united by a continuous dove-tail joint, as explained; thereby avoiding, in the use of such a wheel, many liabilities to accident to which other wrought-iron wheels are subject.

EDWARD FINCH.

No. 6658.—*Combined Sash and inside Shutter Fastener.*

I do not claim to have invented any of the parts employed herein, as separately either is well known; but I do claim as new, and of my own invention, and desire to secure by letters patent, the herein-described method of fastening window sashes and inside shutters by means of two pieces of metal hinged together, or one entire piece, binding the sashes and shutters by the addition of a plate and screw, so that they can only be opened from the inside; the whole constructed and operating substantially as described and shown.

JAMES BELL.

No. 6659.—*Improvement in Treenail Machines.*

Now what I claim as my invention and desire to secure by letters patent, is the combination of the bit with the bit holder and head, and the bits, rod and flange, constructed and operating substantially in the manner and for the purpose herein described.

JOSIAH KIRBY.

No. 6660.—*Improved Self-acting Sash Fastener and Stopper.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the case (D,) made as described, with the bolt (A,) also made as described, by which the bolt is made to *self-act* in locking the sash to the window frame—the spiral groove (G,) in the case acting against the cog C, projecting from the periphery of the bolt, to move the latter forward and throw it into the thimble (F,) of the frame, as the bolt is turned by the descent of the outer extremity of the handle (B,) in the arc of a circle—the bolt being again withdrawn from the thimble to unlock the sash, by simply raising the outer end of the handle in the same arc of a circle, as herein fully set forth.

JAMES C. COCHRANE.

No. 6661.—*Improvement in Ice Cream Freezers.*

What I claim as my invention and desire to secure by letters patent, is the location of the tube A, within the body of the freezer, and forming a part of the same, when combined with the ice tube B, descending from and made fast the cover, substantially in the manner and for the purpose herein set forth.

JOHN DECKER.

No. 6662.—*Improved Angular Rotating Tuyere.*

Having thus explained my invention, I claim the tuyere of a square, rectangular, or hexagon form, having edges, and revolving not on an eccentric axis, but a central axis to break off the scale formed by the fire upon the metal by turning round the tuyere, when such tuyere is constructed hollow, and with apertures of different sizes upon its different faces through which the blast is forced; the whole being constructed substantially as herein described.

SAM'L H. CAMP.

No. 6663.—*Combined Piston, Breech and Firing Cock Repeating Gun.*

What I specifically claim as new in the above described gun, and desire to secure by letters patent, is the construction of a hollow sliding or piston breech pin which is operated by a lever in loading and securing the charge in the breech of the gun, which breech-pin, in addition to the above characteristic, contains or has attached to it, the main spring firing cock or punch, and firing chamber of the priming.

I also claim the plan of transferring the priming from the fixed magazine to the firing chamber in or by means of the said sliding breech-pin, as above set forth and described.

WALTER HUNT.

No. 6664.—*Improvement in Ink Stands.*

I do not claim as my invention forming ink-stands like the accompanying drawing; what I claim as my invention and desire to secure by letters patent, is forming the top or surface surrounding and partially covering the mouth of the reservoir of the ink-stand, of gum elastic, or other similar soft elastic substance, or composition, substantially in the manner and for the purpose herein described.

ANDREW FIFE.

No. 6665.—*Improvement in Dining Tables.*

I claim in combination with the rotary tablet A, the supporting pier C, and tablet B, the mechanism for elevating, depressing and sustaining the rotary tablet somewhat above the stationary tablet, in manner as above described and for the purpose of preventing plates, dishes or articles which may be placed on the tablet B, from improperly interfering with the movements of the rotating tablet.

Furthermore, I do not claim the invention of making a tablet of a fixed part, and one or more moveable or turning leaves; but what I do claim is the above described manner of constructing and combining the leaves and middle parts of the two tablets, whereby the two leaves on each side of the centre of the table may be simultaneously and together turned down into a vertical position, so as to cause the table to have the advantages usually possessed by a common two leaved table.

JOHN C. NICHOLS.

No. 6666.—*Improvements in Rotating Spike Machines.*

Having thus described my improved machine, what I claim as of my invention is as follows, that is to say, I claim in combination with the moveable gauge and pointing dies, the ducts or passages made in the gauge for the distribution of the water on the dies, as described

I also claim the hopper P', and its slide, in combination with the conductor Q, and its moveable frame R, the whole being made to operate together, substantially as above explained.

EDWIN B. WHITE.

No. 6667—*Improvement in Planing Machines.*

What I claim as my invention and desire to secure by letters patent, is giving to the plane irons in passing over the board a compound motion, one around the axis of their shaft and the other rectilinear reciprocating, substantially as described, by giving to the shaft that carries the face wheel O, a rectilinear reciprocating motion, in combination with a rotary motion in the operation of planing, substantially as described.

REID R. THROCKMORTON.

No. 6668.—*Improvement in Machinery for cutting Screws in Bedsteads.*

What we claim as our invention and desire to secure by letters patent, is the combination of the driver or clearer Q, with the hollow cylinder tap N, for keeping the cutter clear of chips during the operation of cutting the female screw in posts for bedsteads, and for other purposes, substantially as described.

JOSEPH GARSIDE.
HENRY J. BETJEMANN.

No 6669.—*Method of connecting the Hammer with the Cylinder of a Revolving Fire Arm.*

Having thus fully described my improved method of connecting the hammer with the cylinder of a revolving fire arm, what I claim therein as new, and for which I desire to secure letters patent, is the employment of the bevel gear introduced into the lock, substantially in the manner and for the purposes set forth, so that two or more chambers can be employed in the cylinder, and chambers of any desired calibre, by changing the relative proportions of the gear, without changing the motion of the hammer.

EDWIN WESSON.

No. 6670.—*Improvement in Machinery for Dressing Treenails.*

What I claim as my invention and desire to secure by letters patent, is the combination of the cutters *a*, with the enlarging and heading apparatus, viz; the cam *g*, the elevating piece T, with *f*, U and *h*.

JESSE FITZGERALD.

No. 6671.—*Improvement in Sugar Pans.*

What I claim as my invention and desire to secure by letters patent, is connecting the two domes of the evaporating pan, by means of a pipe above the top of the pan, the end of which, in the second dome, is turned down, substantially in the manner and for the purpose described, whether the said pipe be inclined downwards from the first to the second dome, or be horizontal, as described.

ALFRED STILLMAN.

No. 6672.—*Improvement in Fountain Pens.*

What I claim as new and desire to secure by letters patent, is the application of a conical metal point or plug, acting in a conical tube, set eccentrically with the axis of the main tube, for the three purposes of guiding the ink to the nibs of the pen, of regulating the supply of ink, and for securing the ink in the tube when not in use, substantially as described and shown.

D. O. MACOMBER.

No. 6673.—*Method of working the Air Pump, and using a Condensing as a non-condensing Engine.*

Having thus fully described my improved machinery, what I claim as my invention and for which I desire to secure letters patent is, first, the combination of the air pump with the engine, in the manner set forth, by which I work it more easily, and reduce the number of actions of the valves one half less than can be done in the ordinary way. I also claim the arrangement for converting the engine into a condensing or non-condensing engine, by opening or closing a free vent for the steam from the condensers, as set forth.

R. F. LOPER.

No. 6674.—*Improvement in Bedstead Fastenings.*

I claim the mode of holding in the block of metal D, containing the catches or locks into which the contiguous ends of the rails are locked, whereby the metal has a firm bearing against the wood of the inner corner of the post on whichever rail the strain of the pulling comes, as described and represented.

SIMEON HOVEY.

No. 6675.—*Combined Construction and Operation of the Drill in Rock Drilling Machines.*

What I claim as my invention and desire to secure by letters patent, is giving to a drill having its cutting edges bevelled, as herein described, a compound longitudinal and rotary motion, substantially in the manner and for the purposes herein described, but irrespective of the devices by which said compound motion is produced.

G. N. DOAN.

No. 6676.—*Gold Washer.*

Having thus fully described the construction and operation of the above described machine, what I claim as new and my invention, and desire to secure by letters patent, is the combination of the helical revolving screen with the dashers upon its periphery, and the conical frustum with a screw therein, by which arrangement the larger and smaller particles are separated, and the latter washed at one operation, all of which is arranged substantially in the manner and for the purpose set forth.

MICHAEL ENGLISH.

No. 6677.—*Improvement in Hill-side Ploughs.*

What I claim as my invention and desire to secure by letters patent, is the double or right and left hand mould boards (*a* and *b*,) revolving upon a horizontal shaft (*c*,) placed across the beam (*A*,) as herein described, using for that purpose, cast or wrought iron, or any other material that will answer the desired purpose.

JOHN W. THURMAN.

No. 6678.—*Improvement in Straw Cutters.*

Having thus described my invention, I claim the combination of the reciprocating arms K K, with the ratchet levers or clicks U and W, in the manner substantially as described, and for the purposes set forth.

LEWIS TUPPER.

No. 6679.—*Improvement in Threshing Machines.*

What I claim as my invention and desire to secure by letters patent, is the employment of adjustable teeth *t*, turning upon pivots *m*, on the concave of threshing machines, substantially in the manner and for the purpose herein described.

his
ABRAM + BLOOM.
mark

No. 6680.—*Improvement in Spinal Supporters.*

I therefore claim as my invention and discovery, (and ask therefor letters patent of the United States,) the combination and arrangement of the steel plates A, B and C, and the bands D and E, combined, as occasion requires, with a band or bands F, all the parts being so formed as to be capable of being united in the manner and for the purposes set forth in this specification, and constituting, when so in union, a machine which gives support to the body when afflicted with any disease which makes such support useful.

HENRY G. DAVIS.

No. 6681.—*Improvement in Chucks.*

What we claim as our invention, and desire to secure by letters patent, is the arrangement and application of two or more geared sectors G, G, G, or toothed wheels V, V, V, with the jaws or pins K, K, K, affixed and meshing into a pinion F, as herein described, in combination with the spur wheel C, and screw E.

JAMES W. MARTIN.
EDWIN PARRY.

No. 6682.—*Improvement in Spring Seat Saddles.*

What I claim as my invention and desire to secure by letters patent, is the combination of the elastic strips (*a*, *a*,) for supporting the seat with the spring (*c*,) contained in the cantle of the saddle tree, substantially in the manner herein set forth.

ROBERT SMITH

No. 6683.—*Machine for bending the Lips of Wrought Iron Railway Chairs.*

What I claim as my invention, is the combination of the former I, the bending levers or bending apparatus, and the base block for supporting the chair blank; the whole being constructed and made to operate together, essentially in manner and for the purpose herein before specified; the drop hammer being employed in combination with the former I, the base block and bending apparatus, substantially as described.

SAMUEL A. COX.

No. 6684.—*Improvement in Graduating Carpenters' Squares.*

What we claim as our invention, and desire to secure by letters patent, is,—

First. The method of spacing or graduating metallic squares or rules with steel types or dies, and with or without figures, in combination with the roller press, suspended in a frame, so that the weight or pressure shall be brought below the centre, and as near the plane of the periphery of the roller as may be consistent with strength to bear the pressure.

Second. The arrangement of the roller, frame and yoke, so as to be raised or lowered by the lever F, all as above specified, and for the purposes herein mentioned.

DENNIS J. GEORGE.
NORMON MILLINGTON.

No. 6685.—*Improvement in Machinery for Jointing Staves.*

What I claim as my invention and desire to secure by letters patent, is combining an oscillating stave carriage (C,) with a reciprocating plane, (B,) in such manner that the former shall be operated by the latter, substantially in the manner herein set forth.

SAMUEL JOBES.

No. 6686.—*Improvement in Spring Mattresses.*

What I claim as my invention and desire to secure by letters patent, is the mode of regulating the elasticity of the mattress, so as to increase or diminish the pressure on any part of the person using it, by the means and for the purposes herein above described. Furthermore, I claim the use of the bolts *g*, and the tubes *i*, substantially in the manner and for the purposes herein above set forth.

PATRICK O'NEIL.

No. 6687.—*Improvement in Bedstead Fastenings.*

What I claim as my invention and desire to secure by letters patent, is the nuts E, for tightening and loosening the hooks C, upon the bars *g*, substantially as herein set forth.

JAMES TAYLOR.

No. 6688—*Improvement in Axles of Carriages.*

What I claim as my invention, is making the axle concavo-convex, combined with the friction rollers, placed in the concavities thereof, in such a manner that the rollers shall protrude from the under side of the axles downward, and rest upon the boxes in the hub, (the upper side of the said friction rollers are never to come in contact with the concavity of the axles,) having the whole load or burden supported by the rollers, and thereby save a large amount of friction, which occurs in using the common or sliding axles.

JOHN J. FLACK.

No. 6689.—*Improvement in Brakes for Railroad Cars.*

What I claim as my invention in the above described mechanism, is the adjustable chisel H, in its combination with the break tread of each brake, the same being made to operate in manner and for the object above specified.

And I also claim the combination of mechanism for elevating the treads of the brakes from the rails, the same consisting of the shaft Y, the parts u^2 and u^1, constituting the clutch, and the levers, chains, and windlasses connected therewith, the whole being applied together, and made to operate essentially as described.

HORACE T. ROBBINS.

No. 6690.—*Machine for Crushing Ice.*

All or nearly all the parts used herein are in previous use in various ways in other machinery, therefore we do not claim separately any thereof as new or as our invention; but we do claim as new and desire to secure by letters patent, the application of a dental faced crushing side *f*, to a hopper, such face being moveable in a centre eccentric with the body of the machine, such application being made in combination with a cam pointed lever formed as described and shown, when such application and combination is used for the purpose of crushing and pushing out the ice, by the same movement which crushes it, and while crushing presses hardest while the mass of ice is strongest, the whole operating substantially as described and shown.

ALFRED C. HOBBS.
JOHN BROWN.

No. 6691.—*Improvement in Machines for Weaving Harness for Looms.*

What we claim as our invention and desire to secure by letters patent, is the method of making weavers' harness by power machinery, substantially as herein described in article 2 of this specification, and as illustrated in figs. 12 to 21, of the drawings, inclusive, whether the carriage containing the harness frame and the shuttles containing the twine be operated by the combination of mechanism herein described, or any other which may be substantially the same, and by which analogous results are produced.

SIMEON HOLTON, Jr.
WILLIAM R. HARRIS.

No. 6692.—*Improvement in Machines for Cutting Paper.*

Having thus described and represented the construction and operation of my machine for cutting paper, what I claim as new and desire to secure by letters patent, is the combination and arrangement of the guide bar C, slide rest D, and adjustable cutter E, in connection with a press or clamp for securing the paper so cut, in the manner and for the purpose substantially as herein set forth and made known.

ALONZO GILMAN.

No. 6693.—*Improvement in Apparatus for operating Shuttle Boxes for Looms.*

What I claim therefore as my invention and desire to secure by letters patent, is the wheel having apertures (or other devices for holding the studs) arranged in radial lines, or nearly so, and at the same time in circles concentric with the wheel, or nearly so, in combination with the moveable studs, and the shoe, or its equivalent, upon the weighted lever, for raising the shuttle box, and allowing them to fall, substantially as herein set forth.

ANDREW ALLEN.

No. 6694.—*Improvement in Moulds for making Glass Pipes.*

What I claim as my invention and desire to secure by letters patent, is not simply the invention of a mould for blowing glass, but I claim the invention of a mould of the shape above described, open at each end, placed in a horizontal position expressly for blowing uniform glass water pipes.

GEORGE SCOTT.

No. 6695.—*Improvement in Machines for Cutting Welts.*

What I claim as my invention and desire to secure by letters patent, is the application of a gauge or gauges to a skiver, whereby welts for boots and shoes may be formed substantially in the manner herein described; distinctly disclaiming the skiver as my invention.

SAMUEL KEEN, Jr.

No. 6696.—*Improvements in the Eccentric Sash-Fastener.*

What I claim as my invention and desire to secure by letters patent, is the combination of the spring (*b*,) with the notched cam (C,) whereby the latter is rendered capable of holding the sash where the simple cam would be insufficient, and is also forced to enter the slot for locking the window.

LEWIS B. PAGE.

No. 6697.—*Improvement in Machines for turning Leaves of Books.*

Having thus fully described the nature and operation of our improvement in the machine called the "leaf turner," what we claim as our invention and desire to secure by letters patent, is—

First. The arms b^3, with their fingers b^5, in combination with the lever B, operated by the circular or coiled spring and the slide and cord, in the manner and for the purposes set forth.

Second. The catch plate C, with its graduating screw and the guard attached to the lever, for the purpose of catching the pendents b^6, as described.

Third. In the lever so combined with the catch plate and guard, I claim the joint, guide, and longitudinal spring, for the purpose set forth.

Fourth. The combination of the pillar, washers, rings and pin, to form independent bearings for the several arms, as described.

J. H. SCHOMACKER.
MARTIN KUEMERLE.

No. 6698.—*Method of reversing Re-acting Rotary Engines.*

Having thus explained my invention, I claim the mode of reversing the motion of the engine by a rack passing through the shaft thereof, and meshing into a pinion on the revolving nozzles, in the manner substantially as herein described.

C. M. MILES.

No. 6699.—*Improvements in Street-sweeping Machines.*

What I claim as my invention and desire to secure by letters patent, is—

First. Arranging two brush wheels abreast in the same machine, substantially as described and for the purposes herein stated.

Secondly. I claim the articulated inflected sweeping plane, composed of two or more curved or inflected sections attached to the carriage in such man-

ner that each section may have either a transverse, vertical, or undulatory motion, substantially as described, and this I claim, whether such sections be connected to each other as herein described, or irrespective of such attachment.

C. S. BISHOP.

No. 6700.—*Improvement in Cooking Stoves.*

What I claim as my invention, and desire to secure by letters patent, is the moveable back plate *b*, and top plate *d*, containing boiler holes, constructed, arranged, and combined substantially in the manner and for the purposes designated.

DAVID JOHNSTON.

No. 6701.—*Improvement in machines for making Wire Heddles.*

I do dot claim making heddles of pieces of wire doubled around pins and twisted by machinery, as this has been heretofore patented; but what I do claim as my invention, and desire to secure by letters patent, is the before-described mode of making wire heddles from a skein or hank of wire by power machinery, by cutting the wire, as it is fed into the machine, into suitable lengths to form, when doubled, the required heddles, and to drop said wires separately on to a horizontal reciprocating, feeding, and discharging hook-rod, by which each wire is doubled into two strands and drawn into the centre of two revolving cylinders turning in contrary directions, wherein the strands are held by pincers and vibrating teeth forced between them until they are twisted into the form of the required heddle, when the heddle is discharged from the cylinders by the reciprocatory movement of the hook-rod, the movements of the several parts of the machine to effect the aforesaid object being produced by a combination and arrangement of mechanism similar to that herein described and represented, or any other which may be substantially the same, and by which analogous results are produced.

A. J. WILLIAMS.

No. 6702.—*Improvement in Can Hooks.*

Having thus explained my invention, I do not claim the jaw levers B B, united together to form a grapple for holding blocks, &c., to be elevated; but what I claim as new and useful is the combination of the fulcrum bar A, with the jaw levers B B, for the purpose and in the manner substantially described.

GEORGE WEBBER.

No. 6703.—*Improvement in Cotton Gins.*

Having thus described my invention and its operation, what I claim as my invention, and desire to secure by letters patent, is the combination of the toothed cylinder *h*, with the screw cylinder *k*, both having their outer surface formed substantially as described, and working together in the manner and for the purpose above set forth. I am aware that toothed cylinders have heretofore been essayed in connection with grooved rollers, for ginning cotton; but when this has been done the grooves have been made directly around the cylinder, or if spiral, have been arranged in lines so nearly parallel with the axis of the cylinder as to operate like beaters, or to force the bolls so rapidly to the end of the toothed cylinder as to prevent them from being properly ginned. I therefore do not claim the toothed cylinder in combination with such grooved cylinders, but only with those having small spiral grooves around their surfaces, running nearly at right angles to the axis thereof, substantially as herein described.

I am also aware that card cylinders have been used in connection with toothed cylinders to strip off the cotton; but in such cases the advantage of delivering the cotton by a current of air directly through an opening is not attained. And I am also aware that brushes attached to the ends of the arms or fans of blowers have been used in connection with toothed cylinders to brush the cotton therefrom, to be thence passed out through an exit mouth in the case of the blower; but in such cases the cotton, when brushed from the cylinder, is rolled and becomes knobbed on the ends of the brushes, and tends to fall upon the bottom of the case of the blower.

But in my said invention the cards on the ends of the arms or fans *c*, hook the cotton from the toothed cylinder and carry it forward without rolling or knobbing it, or allowing it to drop until it reaches the exit mouth, where it is slipped off the teeth by the current of air and carried through the opening 3, to any convenient receptacle, with the fibres free from rolls and knobs. I therefore also claim the blower constructed with cards on the arms or fans, in combination with the toothed ginning cylinder and exit mouth, substantially as described and for the purpose set forth.

STEPHEN R. PARKHURST.

No. 6704.—*Machine for forming the Eyes of Hinges.*

Having described the machinery by which I manufacture hinges, I now proceed to state my claims as follows:

What I claim as my invention, and desire to secure by letters patent, is the lever A, formed and made to move in a compound direction, essentially in the manner herein described, in combination with the spring slide E, by the joint action of which the eye of the hinge may be turned.

D. W. LYON.

No. 6705.—*Improvement in Jointed Pawls.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the pawl C, with the lever (*e e'*,) resting upon the timber (*a*,) and connected to the post A', forming a jointed pivot pawl, arranged and operated in the manner and for the purpose set forth, together with the mode of holding down the lever by a rope as aforesaid, as substantially applied to the purposes of a pawl, by which the advantages named are gained.

SAM'L S. WALLEY.

No. 6706.—*Improvement in Straw Cutters.*

What we claim as new and useful, and for which we desire to secure letters patent, is first, the employment of four feeding rollers in the manner herein described, the top hind rollers having spikes on its surface to hold firmly the straws, &c., and the combination of the said four rollers to feed in the straw or stalks with a steady uniform motion, so that the action of the cutter wheel will not arrest the motion of the sheet of stalks, &c., when fed into the knives, however great the speed of the cutter wheel may be.

Second. We claim the cylinder fluted pinion wheels K K, in combination with the upper face cog wheels J J, to allow the top rollers to rise up and slide down when different thicknesses of stalks, &c., are fed into the cutters, this being a superior manner of gearing to accomplish this object, and avoid all breakage of cogs in the wheels, for the purposes set forth.

THOMAS BURREL.
EDWARD BURREL.

No. 6707.—*Improved Machine for Polishing Knives.*

What we claim as our invention and desire to secure by letters patent, is the grinding drum (*b*,) and sieve (*h*,) and polishing surfaces (*a a'*) arranged on one shaft, whereby the several operations of grinding, sifting, and feeding the polishing material, and polishing the cutlery, are simultaneously performed in a simple and convenient manner.

ASA MUNGER.
ROYAL C. TAYLOR.

No. 6708.—*Improvement in Registers for Hot-air Furnaces.*

What I claim as my invention and desire to secure by letters patent, is the combination of the slide piece and the connecting rod or rods, for the opening and closing of hot-air registers and ventilators, the said connecting rod or rods being so joined to the slide piece as to form a joint at the place of connection, the said connecting rod or rods also forming a joint at their point of connection to the valves or arms thereof, causing the end of the rods joined to the valves to move in a circular direction, corresponding to the motion of the valves when moved. CHAS. F. TUTTLE.

No. 6709.—*Improvement in Parallactic Instrument for Measuring Distances.*

What I claim as my invention and desire to secure by letters patent, is mounting a telescope furnished with a micrometer, upon an axis parallel to its line of collimation, as herein described, whereby the telescope can be made with facility and accuracy to take two parallel positions at the extremes of a given base line, for the purpose of measuring the distance of a remote object by means of the parallactic angle thus obtained, measured by the micrometer.

WM. WURDEMANN

No. 6710.—*Improvement in Machines for breaking Hides.*

I do not claim breaking and softening hides by passing them between two revolving fluted rollers having straight parallel ribs over their surfaces; but what I do claim as my invention and desire to secure by letters patent, is the before described combination of right and left revolving helical breakers, constructed and operated substantially as above set forth, for breaking or softening hides. ISAAC S. HERSHEY.

No. 6711.—*Improvement in Atmospheric Churn Dashers.*

What I claim as my invention and desire to secure by letters patent, is the combination of the loose plunger *h*, with the tubular dasher *b*, the same being made, arranged and operated as herein set forth, or in any other substantially similar manner. WM. M. WRIGHT.

No. 6712.—*Improvement in Cars for Dumping Earth, &c.*

What I claim as my invention and desire to secure by letters patent, is the combination of the rocker and clevices with the double car body, substantially as described, and for the purpose set forth.

MICHAEL BERNEY.

No. 6713.—*Improvement in Horse Powers.*

Having thus fully described my improvements, I wish it understood that I do not claim as my invention the direct application of the power from the master wheel to the line shaft, or pinion of the line shaft, by the employment of two pinions diametrically opposite and matching with the master wheel; but what I do claim as my invention and desire to secure by letters patent, is the combination of the compound wheel K, with the pinions N N, and bevelled cog wheels R R, cogged wheel H, with the propelling pinions F, I, the pinion Q, of the line shaft P, and driving or master wheel A, the whole arranged and operating in the manner above set forth.

WILLIAM WARD.

No. 6714.—*Improvement in Pumps for raising Water.*

What I claim as my invention and desire to secure by letters patent, as an improvement in atmospheric and lifting pumps, is the connexion of the lower valve with the piston, in combination with the trumpet shape of the upper part of the pump chamber, so that when the piston is elevated higher than usual, the water above the piston may return into the well, and the piston rod and both valves be withdrawn from the pump and replaced together when necessary, as herein described.

JOHN B. READ.

No. 6715.—*Improvement in Cooking Ranges.*

What I claim as my invention and desire to secure by letters patent, is the arrangement of the inclined flues E, at the sides of the ovens, and inclined flues F, at the back parts of the same, in combination with the diagonal plates G, and the dampers H, for either causing the heat to pass directly from the fire chamber into the chimney, or over the tops, and down the sides, and after enlarging its volume below, up behind the ovens, as herein set forth.

PHILIP ROLLHAUS.

No. 6716.—*Improvements in Machinery for Dressing Shingles.*

What I claim as my invention is the combination of the following elements:—

1. The inferior or stationary inclined bed E. 2. The elevator K. 3. The stationary plane or knife F. 4. The pressure roller N. 5. The moveable carriage and its ways. 6. The superior or reversed inclined bed Q, having an angular inclination to a horizontal plane of double that of the stationary bed. 7. The plane or knife G. 8. The spring catch bar U. 9. The pressure roller R; the whole being arranged and made to operate together substantially in the manner as above specified.

FRANKLIN JENNEY.

No. 6717.—*Improved Machines for making Brooms.*

What I claim as my invention and desire to secure by letters patent, is the use of two or more sets of jaws (E E',) made and arranged substantially in the manner and for the purpose herein set forth, for compressing the broom brush and holding it on the broom handle during the process of wiring the broom. JAMES THOMAS.

No. 6718.—*Improvement in Flues for Cooking Stoves.*

I do not claim the division plates (B & C,) or the flues formed by them; what I do claim as my invention and desire to secure by letters patent, is the

reverting chamber D′, formed by the angular plate K, and plate H, under the front of the bottom of the oven, as herein set forth, when this is combined with the flues formed by the plates (B & C,) as herein described.

HENRY BLEECKER.

No. 6719.—*Improvement in Cooking Stoves.*

Having thus fully described my improved stove, what I claim therein as new, and for which I desire to secure letters patent, is—

First. The contracted opening in which the fire grate is situated, extending down through the bottom of the stove in part under the grate, and permitting the ovens to be enlarged at that point through which the ashes are discharged and air supplied for combustion, and forming a heated chamber, by which a greater heat is given to the oven quite to the bottom of the stove.

Second. I claim the fire-arch plates with their overhanging projections or ledges, forming diagonal channels so constructed as to prevent clogging with ashes, and admitting air on the sides as set forth.

Third. I claim the combination of the grate and its frame, constructed substantially as described, having an angular depression on the upper surface of the grate, and a segmental curvature on the under side, combined with the fire-arch, as above set forth, and with the connecting bars placed within the ends of the cross bars of the grate to complete the draft.

Fourth. The combination of the air passage *t*, &c., with the centre fire-arch and oven-flues, substantially in the manner and for the purpose herein above described.

WILLIAM WHEELER.

No. 6720.—*Improvement in Cooking Stoves.*

Having thus fully described my improvement in cooking stoves, what I claim therein as new and for which I desire to secure letters patent, is the arrangement and direction of the flue, in combination with a fire chamber the whole size of the top of the stove, the flues forming the first part of the course, being made a part of the walls of said chamber.

WILLIAM SOURS.

No. 6721.—*Improvement in Cooking Stoves.*

Having thus fully described my improvement, what I claim as new and desire to secure by letters patent, is the combination of the flues, substantially as described, so as to cause the draft to pass around the oven the whole breadth on their sides, and thence along side flues, on top to the exit pipe, through the triangular flue in the rear.

I also claim, in combination therewith, the fire-chamber with a grated back, by which I effect an economy of heat by exposing a larger portion of the ignited fuel to the chamber over the oven.

ELIAS KAIGHN.

No. 6722.—*Signal for Privies.*

Having thus explained my invention, I claim the combination of the signal with the bolt of the door of the privy, to operate the signal in the manner set forth, by the bolting and unbolting of the door.

J. H. DOUGHTY.

No. 6723.—*Improved Fire-arm with several Stationary Barrels and a Revolving Hammer.*

What I claim as my invention and desire to secure by letters patent, is a fire-arm with the following essential elements: several fixed barrels and a revolving hammer; the successive discharge of the barrels is effected by the hammer, and the whole is constructed substantially as herein described, but irrespective of the positions of the cones, of the form or position of the hammer, or of the mechanical devices by which the revolution of the hammer is effected or the stroke given.

GEORGE LEONARD, Jr.

No. 6724.—*Improvement in the Land-side of Ploughs.*

Having thus described the construction and operation of my improved plough, what I claim therein as new and desire to secure by letters patent, is diminishing the bearing of the land-side upon the bottom of the furrow, and thus lessening its friction by inclining at least one half of its lower edge on the rear end slightly upwards, but not so abruptly as to prevent it from resting, throughout its entire length, against the land-side of the furrow to sustain the pressure of the furrow slice against the mould-board, and maintain an equal balance of the plough.

ABRAHAM CHRIST.

No. 6725.—*Improvement in Machinery for Riving and Dressing Shingles.*

What I claim as my invention and desire to secure by letters patent, is effecting the several operations of riving the bolt, and shaving and jointing shingles by a single revolving wheel (B,) made and arranged substantially in the manner herein described.

ENOCH R. MORRISON.

No. 6726.—*Improvement in Rotary Churn Dashers.*

I wish it to be distinctly understood that I do not intend to confine myself to the precise construction and arrangement of parts herein described, but contemplate varying the same to any extent which may be deemed expedient.

What I claim as my invention and desire to secure by letters patent, is making the beaters of revolving churn dashers to turn upon their own axes, substantially in the manner and for the purpose herein set forth.

LEWIS W. COLVER.

No. 6727.—*Improvement in Rotary Churn Dashers.*

What I claim as my invention and desire to secure by letters patent, is the combination of the pistons (*a*′,) moved by stationary eccentrics (*d*′,) with the floats (*h*,) of a revolving dasher, in the manner and for the purpose herein set forth.

D. N. EGBERT.

No. 6728.—*Improvements in Couplings for Cars.*

The capacity of the machine for self-adjustment by the laws of gravitation, and the collateral aid of the spring, if necessary, in its application to railroad cars, the ease and certainty by which a separation can be produced by the lever attached, and the advantage of the immediate disconnection that would

follow in case of an accident, by which one car should be thrown off the track and down an embankment, are important improvements and principles claimed by the inventor.

JOSEPH D. ALVORD.

No. 6729.—*Improvement in Gas Generators.*

What we claim as our invention and desire to secure by letters patent, is so constructing the retort furnace that it can receive the whole charge of fuel required for a single operation, and so managing the combustion of the fuel by setting the controlling dampers that it shall cover the space of time usually allotted to the consumption of the gas by the burners, when this arrangement of furnace and damper is combined with the gas holder that controls the feed to the retort, and supplies the same, according to the consumption of the burners, as set forth and described herein.

JOHN WATSON.
EDWARD CART.

No. 6730.—*Improvements in Couplings for Cars.*

What I claim as my invention and desire to secure by letters patent, is the connecting railroad cars by a joint formed by the combination of the head pieces B, with the cylindrical piece A, the joint being held together by the link and pins C D E, the whole constructed and arranged in the manner above described.

H. L. B. LEWIS.

No. 6731.—*Improvement in Frames for Stretching Canvas.*

What I claim as my invention and desire to secure by letters patent, is the method of constructing the frame without mortise or tenon, by cutting the corners to a mitre and securing them by metallic plates, by means of binding screws, inserted through slots, so that the corners may be forced outward by means of four wedges or keys, when the whole is constructed substantially as herein described.

HENRY BRYANT.

No. 6732.—*Improvements in the Spinning Jack.*

What I claim as my invention and desire to have secured to me by letters patent, is driving the spindle carriage forward and back by means of a mangle wheel on which the teeth are arranged in a circular position, and securing the quick and slow motion of said carriage, by alternately driving the mangle shaft L, with gears Q and R, of equal size, and gears T and V, greater or less disproportioned to each other. I also claim stopping the movement of the carriage when it is out, so that the requisite twist may be put into the yarn, by throwing from time to time the pulley Z (on the main shaft A A, and from which the mangle shaft derives its motion) out of connection with said shaft, by the clutch t, operated substantially as herein above described.

I also claim effecting the "backing off" of the yarn from the spindles, or reversing the action of the race belt shaft from time to time, by means of a suspended box or frame N'' containing the self-adjusting studs R'', operated or pressed down by the revolving arm S' on the shaft L, and having a hook T'', which as said box descends, engages with and turns the ratchet U'', on said race belt shaft, the whole being substantially as herein above described.

I also claim changing or varying the transverse movement of the copping or faller wire, by the double ratchet $h''\ j'$, operated as described, the screw rod $f''\ f''$, and chain e'', connected to the shaft b'', which holds the copping wire, the whole being combined, and operating substantially as herein above set forth.

FOSTER NOWELL.

No. 6733.—*Improved Door Lock.*

I do not limit my invention to the precise form or forms of any or all of the parts thereof, but intend to vary the same in any manner and to any extent, so long as I do not substantially change the peculiar parts or combinations claimed as new.

What I claim is one or more concentric depressing tubes $n\ o\ p\ q\ r$, as combined with the series of tumblers and internal or permanent key K, and made to operate therewith, and by means of the external key, (figure 8,) substantially as herein before described.

I also claim the mode of making the internal key K, viz; with the socket in the shank, and the moveable bitt and spring applied to the said socket, the whole being substantially in manner and for the purpose as above set forth.

I also claim the indented or concentric wheel tube and its gear, or turning mechanism, in combination with the series of (or one or more) concentric depression tubes, and its and their tumblers, substantially in manner and for the purpose as specified, the said wheel tube being constructed with one or more recesses or notches for the reception of the projection of its tumblers, under the circumstances and for the purpose as described.

I also claim the head or socket plate z, in combination with the fixed key shank, and the series of concentric depressing tubes, substantially as specified; the same serving to cover and protect the ends of the concentric tubes, and to lock or connect the permanent and moveable keys together, so as to enable the latter to turn the former, all as herein before explained.

EDWIN B. HORN.

No. 6734.—*Improvement in the Motion of Riddles in Winnowing Machines.*

What I claim as my invention and desire to secure by letters patent, is oscillating the shoe diagonally, by means of the bumper, substantially in the manner and for the purpose set forth.

ALEXANDER MOFFITT.

No. 6735.—*Improvement in Paring and Coring Fruit.*

What I claim as my invention and desire to secure by letters patent, is the projecting hollow tube core cutter F, in combination with the lever arm I, in the manner and for the purpose described and represented.

PETER W. HARDWICK.

No. 6736.—*Improvement in Suspender Buckles.*

What I claim as my invention and desire to secure by letters patent, is constructing a buckle or fastener for suspenders and other purposes, of a front plate (B) a spring (A,) with two eyes or places (d, e,) to hold the tongues or pins, and the tongues or pins (f, g,) made of one piece, bent to the shape, substantially as shewn in figures 1, 2 and 4, when the whole is arranged, connected and combined, substantially as herein described.

SHELDON S. HARTZHORN.

No. 6737.—*Improved Form of the Air Chamber of Life Boats.*

My invention and that which I claim, consists in the peculiar enlargement or mode of making each of the decks or upper parts of the air chambers at the bow and stern, each being constructed with a reversed inclination or depression toward the nose of the bow or stern, and an elevation of base high above the gunwale, as represented in the drawings, and as differing from the mode heretofore practised, and substantially delineated on said drawings by dotted lines; the said improvement in the bow and stern air chambers enabling me to obtain advantages, as above stated, as well as many others not herein enumerated.

J. DURELL GREEN.

No. 6738.—*Improvement in Cauls for Veneering.*

What I claim as my invention and desire to secure by letters patent, is the method herein described of interposing between the veneer and the screw, or other device by which it is compressed into contact with the surface on which it is required to glue it, a stratum of some elastic substance, thick enough to be readily compressible into the cavities, and to allow the protuberances of the surface to penetrate into its mass, whereby a sufficient pressure is exerted upon every part of the veneer, bringing it into close contact with the surfaces of all the inequalities of the ground, and effectually expressing the surplus glue from between them.

HAZARD KNOWLES.

No. 6739.—*Improvement in the mode of applying Springs in Time Pieces.*

What I claim as my invention and desire to secure by letters patent, is the using of two driving wheels, (A and B,) propelled by two springs, (C and D,) and so arranged as to exert their driving force on opposite sides of the main pinion, (F,) to lessen the friction, to communicate a uniform motion, and to supply an efficient maintaining power, while each spring is being wound up for what is called "eight day marine time pieces," when the whole is constructed and arranged substantially as herein described.

LEVI BEACH.

No. 6740.—*Improvement in Springs for Chairs.*

Having thus fully described the nature of my new and improved spring, what I claim therein as new and desire to secure by letters patent, is the employment of two or more sets of bow shaped or other regular curved leaves, substantially such as herein described, being made of metal of the same thickness and breadth throughout, or nearly so, and firmly attached by their ends or bearings to the boxes of other fixture by which they are held in place, each leaf composing said springs working separate from the others, as above specified and firmly fastened at their ends or bearings, as applied to chairs and other similar purposes, as described and represented.

THOMAS E. WARREN.

No. 6741.—*Improvement in Dentists' Forceps.*

Having thus explained my invention, I claim the combination of the flexible jaws with the forceps, in the manner substantially described, for the purpose set forth.

EDWARD BOURNE.

No. 6742.—*Improvement in Self-acting Cheese Presses.*

I do not claim to be the original inventor of the self-acting cheese press, but what I do claim as my invention and desire to secure by letters patent, is the employment or application of the rollers I, I, in connection with the levers L, L, L, L, the rollers I, I, being suspended between the follower board G, and the cheese board J, by means of the cords H, H, H, H, ropes, chains, or other suitable suspenders, substantially in the manner and for the purpose above set forth, thereby not merely giving pressure to the cheese, but pressing it with a gradually increasing degree of pressure, as the follower board G, the cheese board J, with the cheese between them descend along the standards C, C.

SAMUEL MANN.

No. 6743.—*Improvement in Seed Planters.*

Having thus fully described my improvements, what I claim therein as new and for which I desire to secure letters patent, is—

First. The combination of the carrying wheel (*c*,) and shaft (*e*,) substantially as described, by means of the spur gear and crown wheel, with a lateral motion by which the quantity of seed sown can be exactly regulated.

Secondly. I claim the adjustable gauge for regulating the depth to which the seed shall be sown, and for the other purposes named, covering and depressing the earth over the seeds.

Thirdly. I claim the mode of securing the parallel motion of all the teeth laterally by means of the diagonal braces, all as herein fully set forth.

J. P. ROSS.

No. 6744.—*Improvements in Machinery for Jointing Staves.*

Having thus explained our invention, we claim the combination of the two planes C, C, with the guide rails F, F, and the gauge G, to set the planes at different angles to joint staves of different bulges, the planes answering the purpose of a face plate, and the one plane shaving in one direction and the other shaving in an opposite direction, in the manner described, or in any manner substantially the same.

We also claim the planes C, C, constructed with the faces f^1 & f^2, in each plane, in combination with the supports I, I, on the planes, to shave off the *rough* and smooth, or finish the jointing by one set of planes, in the manner substantially as set forth.

HOSEA BENSON.
LORENZO D. BENSON.

No. 6745.—*Improvement in attaching Hooks and Eyes to Cards.*

I do not claim any peculiar method of cutting the paper, nor any particular kind of machinery for perforating it for the cards.

What I claim as my invention, and desire to secure by letters patent, is the fastening of hooks and eyes to the cards, in the manner set forth, that is, by means of suitable perforations and crimping, folding or doubling of the cards or paper, thereby dispensing with the use of thread and much labor.

CHAS. ATWOOD.

No. 6746.—*Improvement in Shower Baths.*

What I claim as of my own invention and desire to secure by letters patent of the United States, is the manner of arranging the pump, cistern, lamp and steam tube as herein set forth, substantially in the manner and for the purpose described.

JEREMIAH ESSEX.

No. 6747.—*Improvement in making Dissected Maps.*

What we claim as our invention and desire to secure by letters patent, is our mode of making dissected maps, the same consisting in cutting the sections with the grain of the wood by suitably prepared dies; the paper with the inscriptions or representations being pasted upon the wood before the sections are cut; all as above specified and for the purposes herein mentioned.

SAMUEL McCLEARY.
JOHN PIERCE.

No. 6748.—*Apparatus for Opening and Closing Blinds.*

What we claim as our invention and desire to have secured to us by letters patent, is the apparatus herein above described for opening and closing blinds from the interior of the house, without opening the sashes; said apparatus consisting of a horizontal slotted arm fastened to and projecting from the blind, as described, and a lever arm cast on and projecting at right angles from a sliding and turning rod passed through the window frame, as described.

CHENEY REED.
ELIAS HOWE, Jr.

No. 6749.—*Improvement in the construction of Grain Carriers.*

Your petitioners also claim as an improvement to the original machine the following: At the summit of the machine and underneath it, there are placed two rings, through which (in case the wind is blowing) there is placed a pole twelve feet in length, to which is attached a piece of canvas extending diagonally to the floor, so as to protect the fan from the effects of the wind, and enable it to perform its duty.

What we claim as our invention and desire to secure by letters patent, is the mode of constructing the wire belt or straw carrier, as herein described and represented.

ADAM LINHART.
SAM'L McCLAIN.

No. 6750.—*Improvement in Devices for Sowing Seed in Grain Drills.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the springs *h i*, attached to the vibrating bar or plate *g*, to which the anti-friction roller E, is affixed, zig-zag plate or wheel *j*, and vibrating bar D, having teeth *d*, on its upper surface, for facilitating the passage of the seed or grain through the space between the parallel plates C, as described.

PIERPONT SEYMORE.

No. 6751.—*Improved Self-acting Waste-gate or Sluice.*

What I claim as my invention and desire to secure by letters patent, is a waste-gate which revolves on a horizontal axis placed nearer the bottom than the top of the gate, which is opened and shut by the action of the water, and whose motion is restricted by appropriate stops, the whole constructed and operating substantially as herein described.

AMBROSE TORREY.

No. 6752.—*Improvement in Portable Copying Presses.*

What I claim as my invention and desire to secure by letters patent, is the curved form of the bed and platen plates, as herein before described.

HENRY M. PAINE.

No. 6753.—*Improvement in Machinery for Spinning Flax, &c.*

Having thus described my invention, I claim the balance frame F, constructed substantially as described, and suspended on the axles of the flyer. I also claim the combination of the eccentric G, with the rocker I, the balance frame F, the guide bar J, the regulating bar N, the ratchet lever K, and the ratchet rods M, M, and the ratchet wheel Z, on the spindle which moves the bobbin, to move the said bobbin in the manner substantially as herein described.

CHAS. CLARK.

No. 6754.—*Improvements in Couplings for Cars.*

What I claim as my invention and desire to secure by letters patent, is the combination of a spring tongue (D,) with the self-acting guided coupling pin (E,) arranged substantially in the manner and for the purpose herein set forth.

WARREN D. HATCH.

No. 6755.—*Improvement in varying the speed of the Mandrel in Lathes.*

What I claim as my invention is the combination of gears fixed to the cone of pulleys, and made to revolve with and by them; the two gears G and H, affixed upon a shaft or axle extended or projected from the mandrel, a gear M, affixed on a tubular shaft, through which the mandrel extends, and in which it turns, and the tubular shaft D, the whole being applied to the mandrel and cone of pulleys, and made to operate in connection therewith, substantially in manner and for the purpose as above specified.

WM. A. CHAPIN, Jr.

No. 6756.—*Improvement in Machinery for raising Water from Wells.*

What we claim as our invention and desire to secure by letters patent, is the catching and retaining the sliding plate T, in its proper position whilst a full bucket is being elevated in a well, and detaching the sliding plate at the moment that the bucket is emptied, to allow the position of the plate to be changed, for the purpose of reversing the motion of the buckets, by means of the combination of the lugs *t*, *t'*, projecting from the side of the sliding plate (T,) and the arms *b*, *b'* and *d*, *d'*, projecting from the shafts *a*, *a'*, arranged and operated by the ascent and descent of the buckets, substantially in the manner herein set forth.

We also claim the manner of upsetting the buckets and discharging their contents, by means of rods *g*, that connect the lifting bails of the buckets to the ends of the chain D, and the tilting bails *f*, *f*, combined with the rods *g*, and with the buckets, and operated by the forks *c*, at the ends of the levers *b*, *b'*, substantially as herein set forth.

JEHIAL T. FARRAND.
WILLIAM HINMAN.

No. 6757.—*Improved Composition for Metallic Packing in Steam Engines.*

What I claim as my invention and desire to secure by letters patent, is the application of the composition as above described, for the purpose of packing steam engines. GREEN S. COX.

No. 6758.—*Improvement in Carding Machines.*

What I claim as my invention and desire to secure by letters patent, is the employment of the cylindrical top cards A, in combination with the vibrating strippers E, F, and the main cylinder M, the parts being arranged and operated substantially as herein set forth. DANIEL W. HAYDEN.

No. 6759.—*Improvement in Apparatus for making Mould Candles.*

I am aware that moulds have been adjusted in the frame, by means of a thread or screw cut on the moulds, and that the wicks for whole frames have been supported on wires; I therefore do not claim either of these, as such, as my invention; but what I claim as my invention and desire to secure by letters patent, is the use of the slide G, with the wires E, to sustain the wicks, attached in such a manner that I am able to even and centre the wicks, and when the tallow has cooled, to entirely withdraw the wires from the candles, each by a single motion of the slide (G,) of only about one-half of the diameter of the candle, as herein described.

And I also claim the combination of the use of the mould made with an adjusting thread D, or screw below the end, the shoulder on which the tallow table rests, and a hole *d*, for the wire, with the slide G, and moveable tallow table (fig. 7,) when the whole is constructed and combined, substantially as herein described. ANDREW L. BROWN.

No 6760.—*Process for making Steel.*

We take occasion here to observe, that since our invention, the hot carbonic oxide blast has been applied to some extent, in the manufacture of iron, both in Europe and America, but we have priority and originality in the mode of application, as herein described, of this important gas to the manufacture of steel.

We do not claim to have been the first who have melted iron in a common cupola furnace, charged in the usual manner, and urged by blasts of hot carbonic oxide gas; but what we do claim as our invention and desire to secure by letters patent, is the process herein described, of manufacturing steel, by producing first, a metal imperfectly converted in the cupola furnace, in the manner described, and then submitting said metal to the refinery, constructed as herein described, where the article is perfected by the means above made known; secondly, we claim the horizontal blast in the refining furnace, as above more particularly stated, for blowing a blast of carbonic oxide as herein set forth.

NORMAN M. ISHAM.
ERASTUS E. MARCY.

No. 6761.—*Improved Foot Valve of Steam Engines.*

What I claim as my invention and desire to secure by letters patent, is constructing the entry valve of a pump which draws water from a condenser of less specific gravity than water, and arranging it substantially in the manner herein set forth, beneath the valve seat against which it is supported by the water in the valve chest, so that when the pump piston is withdrawn in the barrel, and the water in the valve chest recedes from the valve, the latter being unsupported, will fall and allow the water in the condenser to flow into the pump through the opening in the valve seat, but when the water fills the valve chest, the valve being lighter than the water, will float upwards and close the opening.

S. W. ROGERS.

No. 6762.—*Improvement in the mode of operating Brakes for Cars.*

I am aware that brake levers have been placed between the trucks of a car, and that a brake lever thus placed has been connected by its fulcrum with the brakes of one truck, and by its working end with the brakes of the other, so that the brakesman can bring both sets down upon the wheels at once, and cause each to act with the same force as if the other was not in operation. I do not, therefore, claim doing merely this, but when this has been done the levers have not been so arranged as to act with equal force upon the wheels of both trucks, nor have they been conveniently arranged for application to such brakes as my arrangement is applied to.

What I claim therefore as my invention and desire to secure by letters patent, is the peculiar manner, herein described, of arranging the levers and connecting rods, in combination with the brakes, so as to apply both sets of brakes with equal force, by working either brake wheel.

NEHEMIAH HODGE.

No. 6763.—*Improved arrangements of the Conductors in Centrifugal Gold Washers.*

And what I claim as of my own invention in the above contrivance, is the arrangement of conductors, (on the inner surface of a revolving metallic or other containing vessel,) overlapping each other, thus permitting the particles to be subjected to the action of the water, in their passage from one conductor to another.

LEMUEL P. JENKS.

No. 6764.—*Improvement in Adjustable Churn Dashers.*

Having thus fully described the nature, construction and operation of our churn, what we claim therein as new and desire to secure by letters patent, is making adjustable to any desired angle the concave beater, rotating vertically in the process of churning, and thus extending the pneumatic action incident to its concavity to any quantity of milk, the surface of which and the face of the beaters can be made to meet in the same plane, as described.

THOMAS G. CLINTON.
GEORGE H. KNIGHT.
EDWARD H. KNIGHT.

No. 6765.—*Improvement in Machines for making Wash Boards.*

Having thus fully described the nature, construction and operation of my invention, what I claim therein as new and desire to secure by letters patent, is driving by pressure and simultaneously the series of nails necessary to attach one part of a wash board, box, or other article, to another part of the same, as the case may be, by means of the combination of machinery, as described, or any equivalent device, viz: the blocks (*m*,) with their series of drivers (*z*,)

and the blocks (l,) with their series of nail boxes or mortises (s,) springs (s',) and cylindrical guide openings (y,) the blocks (l,) forming to this extent a portion of the apparatus for nailing by pressure.

I claim the combination of the apparatus for driving nails by pressure, as described in the foregoing specification, with the clamp (d,) and the blocks (l,) acting as clamps on the article to be nailed by the drivers (z.)

I claim the combination of machinery as described, viz: the pressure blocks (l,) in their distinct and separate capacity as such, the table (i,) bed (k,) and clamp (d,) by which the crimped and edge sharpened sheet metal is made to incise the wood, and by which, in addition thereto, the legs and body board of a wash board are put and held in suitable juxtaposition for the operation of the drivers, whether the combination of machinery, as described, be operated by levers, toggle and treadle, as described, or by any equivalent devices.

And, lastly, I claim the combinations of machinery, viz: blocks (m,) drivers (z,) blocks (l,) mortises (s,) springs (s') guide openings (y,) ways (j,) table (i,) bed (k,) and clamp (d,) by which I clamp, incise and clamp, and nail, in the order described, the several parts of a wash board, as described, or a box, or other similar article, whether operated by levers, toggles, and treadles, as described, or by other equivalent power.

WILLIAM B. STEWART.

No. 6766.—*Improvements in Sewing Machines.*

Having thus described our improved sewing machine, we shall state our claims as follows:

What we claim as our invention and desire to have secured to us by letters patent, in the above described rotary sewing machine, is arranging the shuttle which carries the filling thread, so that it shall revolve horizontally in a circular shuttle race, said shuttle being constructed with a curved front and pointed nose, which shall travel in a circular guiding groove, sunk below the bottom of said race, so that the shuttle shall invariably pass through the loop formed in the needle thread, all as herein above set forth.

We also claim the pad or washer under the spring arms which carry the shuttle for keeping the filling thread straight, as herein before explained. Furthermore, we claim the arrangement of the wide spring c' c', and bent lever spring f'' f'', operating as herein above described, or any contrivance substantially equivalent thereto, for relaxing the needle thread when the loop is to be formed, and holding it rigidly when each stitch is to be tightened, as herein above set forth.

We also claim the converging nipper springs, through which the needle, &c. passes, to keep the thread up, and prevent the needle from splitting or breaking it, as herein above set forth.

SHERBURNE C. BLODGETT.
JOHN A. LEROW.

No. 6767.—*Improvements in Machinery for Mitre Sawing.*

I claim the arrangement of circular saws or cutters, revolving vertically, secured to a bed or block, having a horizontal circular motion, the saws or cutters being fitted to arbors moving freely backward and forward in the direction of their axes, this motion of the axes being governed by *guide bars*, attached to blocks capable of being shifted to any angle with the line of the direction of the stuff to be operated on, these blocks being attached to the moving carriage for the said stuff, and these guide bars operating in grooved pulleys on the axes of the said saws or cutters, keeping them, the saws and cutters operating in a line parallel with the said bars, the result of which is that as the stuff to be sawed, with the carriage on which it is placed, advances on the machine, the movement of the saw is in the diagonal line indicated by the direction of the *guide bar* and the cutting of the material conformable thereto, so that at whatever angle the *bar* is placed, with the direction of the material operated on, at such angle will the saw cut it.

I claim the combination of mechanical apparatus in the above specification set forth, by which oblique angled joints, tenons, or work of a similar character can be done, operating if desired, upon both the ends of a piece of stuff at once, and making in that case, similar or dissimilar joints or cuts at the two ends at one operation.

DENNIS S. STOW.

No. 6768.—*Removable Water Lining for the Fire Boxes of Steam Boilers.*

What I claim as my invention and desire to secure by letters patent, is a removable sectional or continuous water lining or false fire box, made and arranged substantially in the manner and for the purpose herein set forth.

JOHN J. DE HAVEN.

No. 6769.—*Improved Machine for Filing Circular Saws.*

What I claim as my invention and desire to secure by letters patent, is the combination of the adjustable collars (k k' and l,) with the adjustable rectangular timbers or blocks D, for regulating the up and down play of the levers F, F', and files 3, 4, and moving them to either side, as occasion may require, as described, thus adapting the machine to various sized saws.

ISRAEL F. BROWN.

No. 6770.—*Improvement in Boot Crimps.*

What we claim as our invention and desire to secure by letters patent, is the combination of the top (c,) and toe (c',) blocks and their respective sheaths D D', with the leg (B,) heel (B'',) and foot (B',) clamps, the whole arranged substantially in the manner and for the purpose herein set forth.

ELI B. HORNER.
W. HOLLAND.

No. 6771.—*Improvement in Gold Washers.*

What I claim as my invention and desire to secure by letters patent, is the combination of the perforated screen a, with the ore and water leader l, and the jet tube k, whereby the materials capable of passing through the holes of the screen, are at once separated from the coarse gold and gravel, and the meshes of the screen are kept perfectly clear.

I also claim the agitator c, with its fingers g, g, g, so constructed and operating, that they can have only an alternating motion in combination with the cistern f, whereby the coarse particles of gold are separated from coarse sand and other materials, while a current of water is flowing over them, in the manner herein set forth.

I also claim the arrangement in a single machine, of the revolving screen a, and the amalgamator h, the finger g, g, and the cistern f, whereby the

washing and amalgamating of gold in fine particles is performed simultaneously and at one operation, with the washing and separating of coarse gold from sand and gravel with amalgamation, in the manner and for the purposes substantially as herein set forth.

LOUIS LACHARME.

No. 6772.—*Improvement in Portable Ovens.*

Having thus described my improvements, I shall state my claim as follows: What I claim as my invention and desire to have secured to me by letters patent, is the combination with the back of a common cylindrical air-tight stove, of an oven frame, and a portable trapezoidal oven, susceptible of being hinged to, or unhinged from said frame, as herein above set forth.

CALVIN DOANE.

No. 6773.—*Improvement in Water Wheels.*

Having thus fully described my wheel, what I claim therein as new, and for which I desire to secure letters patent, is forming the water courses of a series of horizontal flanges with inclined openings for communication, as described, and with contractions or buckets placed at intervals in said compartments, substantially in the manner and for the purpose set forth.

W. G. MASTERSON.

No. 6774.—*Improved Jointed Centre Board.*

I therefore claim and desire to secure a jointed centre board, constructed substantially as herein described, having its two ends connected with the false keel, into which it is recessed, and its centre portions jointed and connected with a rod that passes up into the vessel, by which it can be worked up and down, in the manner and for the purposes set forth.

THOS. MASKELL.

No. 6775.—*Improvement in Cooking Stoves.*

Having thus fully described the nature and construction of my invention, what I claim therein as new and desire to secure by letters patent, is extending the front diving flues *(c,)* along under the hearth plate, aside as at *(d,)* and in front, as at *(e,)* of the ash pan, and thence down in front of the oven plate, thus forming there an open flue, when the oven is extended under the hearth plate, in the manner and for the purpose herein described.

JAMES LEFFEL.

No. 6776.—*Improvement in Hydraulic Presses for Cotton, &c.*

What I claim as my invention, and desire to secure by letters patent in the double hydrostatic press, is connecting the two rams substantially in the manner set forth, so that they shall operate together, and with equal effect, upon the platen of the press, all as set forth.

CHARLES WILSON.

No. 6777.—*Improvement in Churns.*

What I claim as my invention and desire to secure by letters patent, is the combination of a reciprocating dasher *(h,)* with a revolving dasher *(b,)* the two being arranged and operated substantially as herein set forth.

ALEX. HALL.

No. 6778.—*Improvement in Burring Cylinders.*

Having thus described my improvements, I shall state my claim as follows:—

What I claim as my invention and desire to have secured to me by letters patent, is a cylinder for burring, opening, picking, carding, &c., cotton and wool, in which the burring or working surface is formed by alternate rows of sharp pointed teeth, and thin metallic edges either set spirally or straight across the cylinder, whether said teeth and edges are constructed and shaped as above set forth, or in any other way substantially similar thereto; it being distinctly understood that my claim is to the burring or working "*surface*," produced as above suggested.

CHAS. G. SARGENT.

No. 6779.—*Improvement in Supporters for Telegraph Wires.*

What we claim as our invention and desire to secure by letters patent, is the uniting and confining the shank of a pendent wire holder, or the upright portion of a supporter within a protecting socket or cavity by means of some suitable insulating substance placed while in a fused or softened state within the socket or cavity, and occupying the space between its interior surface and the shank of the holder or supporter, substantially in the manner herein set forth; not intending, however, to limit ourselves to the particular forms or positions of the insulated wire holders and supporters referred to above, the essence of our invention as therein claimed, being the production of an insulated connection between the wire supporters and the holders, by placing the insulating material, while in a fused or softened state, within a socket or cavity in the one and around the shank of the other.

We also claim the manner of confining the telegraph wire to the holder G, by means of a notch or hook thereon and a loop or link *s*, combined therewith, substantially as represented in fig. 3.

L. R. LIVINGSTON.
AMOS KENDALL.
ALFRED VAIL.
J. J. ROGGEN.
CALVIN ADAMS.

No. 6780.—*Improvement in Hanging Shafts in Mills.*

I do not claim the suspending a box or bearing for a shaft by means of the ball and socket joint, nor the making the same in several parts; but what I do claim as my invention and desire to secure by letters patent, is the general arrangement and construction of the complete hanger or pillow-block, with or without the oil-catcher forming a part thereof, made substantially in the manner and for the purposes herein above described.

EDWARD BANCROFT.

No. 6781.—*Improvements in Ore-Washers.*

Having thus fully shown the construction and operation of my gold-washer, what I claim as new and my invention and desire to secure by letters patent, is—

First. The arrangement of the bevel wheel with a rib on the back, in com-

bination with the pin O, set screws N, and pinions L and M, which are for the purpose of giving a reciprocating rotary motion to the pan.

Second. The vibrating pump in combination with the pan.

Third. The reciprocating rocker with curved ribs, in combination with the shaft F, and its fingers, substantially in the manner and for the purpose set forth.

JACOB PRITCHETT.

No. 6782.—*Improvements in Reciprocating Propellers.*

What I claim as of my own invention and desire to secure by letters patent, is the combination of the sliding frames (b, b',) to which the paddles are attached with the horizontal guides (c, c',) and vertical guides (d, d,) said paddles being actuated by motion derived from, and mechanism connected with, the engine shaft, and the whole being constructed, arranged and operating substantially as herein described, whereby a more extended horizontal motion of the floats, in comparison with the length of their vertical motion, is obtained.

H. W. HEWET.

No. 6783.—*Improvement in the manufacture of Band Boxes.*

What I claim as my invention and desire to secure by letters patent, is the construction of the concavo-convex heads or top and bottom boards C D, inserted into grooves formed in the bodies of the box and lid and secured by glueing, with the additional concavo-top board E, susceptible of being replaced at pleasure, as herein set forth.

WILLIAM TABELE.

No. 6784.—*Improvement in Bed-plates for Paper Engines.*

What I claim as my invention and desire to secure by letters patent, is not the construction or use of a rag engine bed-plate, with upright edges or knives, made of steel plates, and doubled together, and which has been heretofore in use for grinding rags; but what I do claim, is casting the bed-plate of the paper engine in one piece, having the cutting or grinding edges arranged over the surface of the plate in diamond or lozenge shaped figures, or in curves, so as to present a number of angles or shearing edges for the rags to pass over between that surface and the roller above, in the manner and for the purpose set forth.

WILLIAM CLARKE.

No. 6785.—*Improvement in Lapping Machines.*

What I claim as my invention and desire to secure by letters patent, is the manner in which the heads are constructed and arranged so as to revolve in removing or changing the laps; also the introduction of the doubling roller as part of the same machine, and the manner in which the adjusting guides are constructed, so that one or more can be displaced and the remainder uniformly divided into the same space occupied by the whole, whether the arrangements are precisely the same as herein represented, or in any other manner which is substantially the same, and producing a like result upon the same principle.

SAMUEL CAMPBELL.

No. 6786.—*Improvement in Elastic Cords for Suspenders.*

I do not claim simply covering threads of metallic or vulcanized rubber with braid, as this has long since been done, but not whilst the India rubber is in a state of tension; nor do I claim simply combining non-elastic cords with the button hole pieces, and with the shoulder straps of suspenders, by passing such cords through loops or around rollers attached to the shoulder straps, as this has also been long known; but—

What I claim as my invention and desire to secure by letters patent, is the making of elastic cords for suspenders, by braiding or winding silk, cotton, or other threads around cords of metallic or vulcanized India rubber, whilst in a partially distended state, substantially as described, whereby springs of greater resisting force are produced than by any other known plan.

NELSON GOODYEAR.

No. 6787.—*Improvement in Cooking Stoves.*

Having thus fully, clearly, and exactly described my improvements in stoves, what I claim therein as new and desire to secure by letters patent, is constructing and arranging the top or boiler flue *(a,)* the middle flue *(f,)* and the side flues *(l,)* of the flues between the ovens and the corner flues *(l',)* at the back of the lower oven, so that by opening the dampers *(t,)* and *(s,)* the upper oven *(d,)* can be rendered operative alone, or by closing the same dampers *(t,)* and *(s,)* be operated in connection with the lower oven *(e,)* the flues *(j,) (k,) (l,) (l',)* and *(q,)* and guide plate *(r,)* being so constructed and arranged that the heat and draught will be compelled to pass along the sides and corners of the stove, when these flues are thus or in an equivalent manner called into action, the heat being thereby most equably distributed, as the hot draught is thus made to traverse an equal distance both above and below the lower oven, and also surround the centre of the stove, and of course keep the said centre at the same temperature as the sides and corners, the whole being arranged, constructed and combined in the manner and for the purpose described.

HANNIBAL MATHEWS.

No. 6788.—*Improvement in Ploughs.*

What I claim as my invention and desire to secure by letters patent, is joining the lower edges of the mould board, and fixed land side *d*, by means of a sole *e*, cast in one piece with them, whereby the plough is greatly strengthened, and the fastening of the share rendered more secure.

Second. I claim making an aperture *h*, through the side of the fixed landside, for the purpose of introducing a wrench to turn the nut on the bolt which holds the share to the sole, the aperture being combined with the manner herein described of fastening on the point.

BENJAMIN SEYLER.

No. 6789.—*Improvement in Apple Parers.*

I lay no claim to the invention of the combination of a rotating apple holder or shaft, and a knife fixed to a bar, whose movements, in order to keep the knife against the surface of the apple during the operation of removing the peel, are directed by the hand of a person applied to it; but what I claim as my invention, is the use of the upright lever arm Q, in combination with the rack bar P, for working the knife in the manner and for the purpose set forth

I also claim the upright lever Q, in combination with the inclined lever bar R, and discharging bar W, in the manner and for the purposes described.

CHARLES P. CARTER.

No. 6790.—*Improvement in Tanning Leather by Tannin and Acids.*

What I claim and desire to secure by letters patent, is—

First. The process of removing hair and wool from skins, and of liming them preparatory to tanning, by the use of the composition of lime, wood ashes and salt, called composition No. 1, in the manner above described; but I do not claim either of these materials separately by itself.

Second. I claim the process of tanning skins by the use of tannin, in combination with muriatic acid, generated by a mixture of sulphuric acid and cloride of sodium in water with the tannin, in the manner substantially as above described.

Third. I claim also the use of the acetate of lead, in the above process of tanning, as described.

HARMON HIBBARD.

No. 6791.—*Improvements in Ore Washers.*

What I claim as my invention and desire to secure by letters patent, is the rotating screen, substantially as described, in combination with the rockers and drag chains within it, substantially as described.

I also claim the rotating screen, with the spiral blades on its outer periphery, in combination with the trough in which it works, and through which the substances delivered by the meshes of the screen are made to pass, substantially as described.

I also claim the washing trough, with its compartments, in combination with the rockers and drag chains, substantially as described.

And, finally, I claim the longitudinal grooves or chambers in the bottom of the trough, and at right angles to the motion of the rockers, and in combination with such rockers, substantially as described.

PETER VON SCHMIDT.

No. 6792.—*Improved Machinery for drawing out and compressing Heated Iron.*

What I claim as my invention and desire to secure by letters patent, is the method of working puddlers' balls, or other highly heated masses of iron, and reducing them into bars, by rolling and squeezing them gradually from one end, and by surfaces whose motion or motions is at right angles, or nearly so, to the axis of the bar to be produced, substantially as herein specified.

And I also claim as my invention in the machinery for the application of my improved method of working iron, the rolling and squeezing of balls or other highly heated masses of iron, between surfaces inclined to the axes of the bar to be produced, substantially as described, so that by the motion of one or more of the said surfaces at right angles, or nearly so, to the axis of the bar to be produced, the mass of iron shall be gradually squeezed and reduced and carried towards and out of the space between the said inclined surfaces where they are nearest together, the iron bar being thus delivered in the required form, substantially as described.

H. BURDEN.

No. 6793.—*Improved Journals for Oscillating Propellers.*

Having thus described my improvement, what I claim and desire to secure by letters patent, is the application of springs to the journal boxes in such a manner as to ease the strain upon the cranks and paddles when the paddles meet with an extra weight or resistance suddenly, thereby lessening very materially the danger of breaking the cranks and other parts of the machinery which are combined and operated substantially as herein set forth.

MATTHEW A. CROOKER.

No. 6794.—*Improvement in Boot Crimps.*

Having described my improvement, and the manner in which I construct my instrument, what I claim as my invention is the method of securing and holding on to the leather by means of the wedge operating in the mouths or openings in the ends of the prongs of the instrument, as herein described and set forth.

BENJAMIN LIVERMORE.

No. 6795.—*Improvement in Accoucheurs' Chairs.*

What I claim as my invention, and desire to secure by letters patent, is the seat, which from its peculiar form and structure, closely resembles that part of the human frame between the knees and the breech.

And I further claim varying the angle which the seat makes with the back, by moving the middle posts forward or backward, by means of the tightening screws 21, and the grooves on the front end of the braces 4, through which groove the said tightening screws pass into said middle posts 2, the object of all which is to afford relief to a patient in travail by means of changing her position and furnishing supports for her feet and limbs, and objects for her hands to grasp.

NEWMAN W. SMITH.

No. 6796.—*Improvement in Instruments for arresting Hemorrhage from Internal Organs or Cavities.*

What I claim as my invention in the foregoing described instrument, is the application of an elastic and detensible bag, sack or bottle, to various of the canals or cavities of the human body opening externally, and the subsequent distension of the same by forcing into it air or other available fluids for the purpose of arresting hemorrhage, and this do I desire to secure by letters patent.

ASHBEL BRADFORD HAILE.

No. 6797.—*Improvements in Looms for Figured Fabrics.*

What I claim therefore as my invention, is a combination of machinery, composed of the following elements, and applied to a series of shuttle boxes for moving and operating them as specified:—

The first element of combination is the series or two packs of pattern plates.

The second element is the two slide or moving frames by which the plates are moved horizontally, as above described.

The third element is the machinery for moving the pattern plates in vertical directions, one set being moved upwards and the other set downwards, substantially as specified.

The fourth element is the system of hooks $e' e'$, &c., their lever plates $h' h'$, &c., bell crank levers and connections.

The fifth element is the slide board R, and its series of slides $h\ i\ k\ l$, &c., and their projecting pins and appliances, as above described.

The sixth element is the system of bent levers V W, pawls T U, and mechanism for moving the same, as described.

The seventh element is the toothed sector and rack, which connects the long arm of the series of shuttle boxes with the slide board R.

I also claim the combination of machinery applied to shuttle boxes, and for the purpose of preserving the position of the series while any shuttle thereof is in operation, the said combination consisting of the series of pins $i^3\ i^3$, &c., the fork lever k^3, the lever n^3, and its hinged spring plate s^3, the slide y^3, and its pins or studs, the spring pawl u^3, and their appurtenances, the whole being made to operate together substantially as above specified. I wish it distinctly understood that I do not intend to confine my claims to the construction or form given to each element of combination, as above described, but intend to vary the same as circumstances or necessity may require, while I do not change its character or principle of operation.

JOSEPH REYNOLDS.

No. 6798.—*Improvement in Cooking Stoves.*

Having thus fully described the nature and operation of our invention, what we claim therein as new and desire to secure by letters patent, is—

First. Providing for the escape of the steam and effluvia from the cooking victuals in a reverberating boiling chamber, a channel arranged so as at the same time to isolate the upper oven from the top flue, and by means of the currents keep it cool as well there, as where bounded by the fire plate.

Second. So forming and arranging the plates dividing the lower from the upper oven and ash pit, with a descending flange to the upper plate, and an ascending flange to the lower plate, that a passage to the flues for the fumes of the lower oven is provided, without weakening the plates, or permitting the ashes to fall through.

Third. So arranging a vertical dividing plate in the front flue, in connection with the damper, that a part of the heat of the fire can be applied more directly to the front plate of the lower oven.

Fourth. So constructing and arranging a damper in connection with the flues, division plate and stack, with or without the recess in the front plate, as described, that the draught can be thrown either entirely around the stove, or in part down the front of the same, or be entirely shut off, or have direct entry to the stack.

THOMAS G. CLINTON.
GEORGE H. KNIGHT.
EDWARD H. KNIGHT.

No. 6799.—*Improvement in Grate Bars.*

What I claim as new and my invention and desire to secure by letters patent, is making the centre of the lower face or under side of the bar with the same swell or elevation as the upper or top face, as shown at a, a, in the accompanying drawing; b, b, b, b, being the bars, c, c, c, c, c, c, the spaces; the bars connected at d, d, d, d; e, e, e, e, being the shoulder or rabbit to support the bar when in its place in the furnace, and f, f, f, f, being projections to meet similar projections on the adjoining bars, to keep them at the proper distance apart.

I do not claim as my invention, making the upper side of the bar with the swell or elevation in the middle of its length; but I do claim as my invention, making the upper and lower faces of the bar with the same rise or elevation, so that when the upper or top face of the bar is destroyed by the action of the fire, the bar can be turned, or inverted, making the lower side to become the upper surface, and by that means present a new surface to the fire, causing thereby a considerable saving in the expense of furnace bars.

I do not mean to be understood as limiting myself to any particular number of bars in each series, but to make one, two, three, or any other number of bars in each series as may be required, substantially as above described, for the purposes therein set forth.

C. KINGSLAND.

No. 6800.—*Improved method of attaching Knobs to Doors.*

I do not claim the mode of fastening the one knob on to the door, by means of screwing the circle plate thereto, nor do I claim the mode of inserting the one shank into the other, for the purpose of accommodating the thickness of the door; but what I do claim as my invention and improvement and desire to secure by letters patent, is the mode of holding in position the knob figure 4, by means of the end of the latch, figure 3, being pressed through the opening m, into the stirrup at h.

J. A. CREVER.

No. 6801.—*Improvement in the Rockers of Gold Washers.*

Having thus fully described my improvement, what I claim therein as new and for which I desire to secure letters patent, is the compound action rocker, constructed and arranged substantially in the manner and for the purpose set forth, consisting of rockers with ribs or projections thereon, and springs to arrest them.

I also claim the sliding plate, in combination with said ribbed rocker, as above described.

THOMAS J. GREEN.

No. 6802.—*Improvement in Bog Cutting Machines.*

What I claim as my invention and desire to secure by letters patent, is the box or sledge provided with horizontal and vertical knives, which project from its side, cutting off the hummocks or tufts, the whole being made and arranged as herein set forth.

ABNER FOLLET.

No. 6803.—*Improved Double Cylinder Spike Machine.*

What I claim as my invention and desire to secure by letters patent, is the method of forming or compressing a spike between half dies on the periphery of two cylinders revolving in opposite directions, the axis of the spike being parallel with the axis of the cylinders, substantially as herein described, said cylinders being provided with appropriate devices for cutting off, feeding in, and heading the spikes.

EDWIN B. WHITE.

No. 6804.—*Improvement in Machines to Manufacture Horse Collars.*

What I claim as my invention and desire to secure by letters patent, is the combination of the T shaped segmental sliding forming blocks F, with the central oval shaped forming block C, and mortised bench A, into which they are secured, said sliding segmental forming blocks being pressed against the rim of the collar, by means of keys, in the manner herein fully set forth. The oval shaped former and bench are not claimed individually or in connection, as they have been heretofore used for making horse collars, in combination with a rope and windlass for drawing the collar around the block, the before described machine being principally designed for bending and holding the rim of the collar to its required form, the shaping of the rest of the collar being done in the usual manner.

WILLIAM CRISWELL.

No. 6805.—*Improved Method of giving a rotary motion to the melted Iron in Casting Chilled Rolls.*

What I claim as my invention, and desire to secure by letters patent, is the application of a guide to the mouth of a gate entering the mould horizontally in direction at right angles to the axis of the cylinder, for the purpose of producing the swirling motion of the iron. I also claim, in connection with the guide, the use of the collar connecting at all parts of the circumference with the mould, so as to admit the iron in a steady stream at all parts at the same time.

JOHN C. PARRY.

No. 6806.—*Improvements in Jacquard Looms.*

What I claim as my invention therefore, and desire to secure by letters patent, is—

First. Giving to the jacquard frame ofjacquard looms working by power, a separate organization, that is, giving the various motions of the jacquard by a shaft or shafts within, or making part of the jacquard in contradistinction to the weaving loom, but receiving motion from the loom or from some first mover governed by or working in unison with the loom, substantially as described and for the purpose specified.

Second. I claim the method of adjusting the jacquard frame relatively to the weaving loom, substantially as described, so that the attendant can from a given point make the adjustment to suit the condition of the harness, as described.

Third. I claim taking the motions for operating the picker-staffs, and the apparatus for shifting the shuttle boxes from a shaft or shafts placed above and in combination with the pendulous frames which carry the shuttle boxes, substantially in the manner and for the purpose specified.

And lastly, I claim in combination with the power loom a reversing motion, substantially as described, so that after the driving power has been removed, and the momentum of the moving parts arrested, the attendant may set in motion the reversing motion, and drive the loom in the reverse direction to bring the parts to the position required for re-starting, substantially as described.

E. B. BIGELOW.

No. 6807.—*Improvement in Cooking Stoves.*

What I claim as my invention and desire to secure by letters patent, is the manner herein described of causing the air contained within the oven and spaces to circulate within and under the oven, without allowing the heated air to pass from the oven or spaces into the fire chamber or smoke pipe; which effect is produced by locating the plate *e*, within the oven and near the fire back *d*, and connecting the space between *e* and *d*, with the body of the oven and with the space between the bottom plate of the oven and the plate *b*, and also connecting the space below the bottom plate of the oven with the rear end of the body thereof, substantially as herein set forth.

Not intending by this claim to restrict myself to the mode of construction herein described, but to vary the same as I may deem expedient, while I attain the same ends by means substantially the same.

JAMES R. STAFFORD.

No. 6808.—*Improved Spring Latch Bolt.*

I wish it to be understood that I do not claim the making of the latch bolt in two parts, and in other respects as I claimed in the specification of the application for a patent, to which I have herein before alluded, and which is now lodged in the patent office of the United States; but that which I do claim as my invention and desire to secure by letters patent, is arranging the spring in the cavity of the bolt, with one end of said spring bearing upon the end of the cavity in the bolt, and the other end of it, or its equivalent, upon the tumbler, as herein described, whereby I am enabled to dispense with the usual bearings for the spring external to the bolt.

ELIAS M. RAY.

No. 6809.—*Improvement in Planing Machines.*

What I claim as my invention and desire to secure by letters patent, is the combination of adjustable stationary planes, with an endless band supported transversely by friction rollers (*h*, *h*,) whose axes are immediately below the cutting edges of the plane irons, and longitudinally by strips (*f*, *f*,) substantially in the manner and for the purpose herein set forth.

ENOS G. ALLEN.

No. 6810.—*Improvement in the Construction of Iron Stairs.*

Having thus described my improvement in the construction of metallic stairs and the advantages arising therefrom, I claim as my invention and de-

sire to secure by letters patent, constructing stairs in sections composed of the bent lever and under brace connected together, as shown in fig. IV, the tread and brace being part and parcel or continuous with the balusters, the one bent at right angles, the other at the requisite angle for the brace.

I also claim the bent levers, as herein before described, in combination with the rail, either continuous or in sections, attached to the end of the long arm of said lever, together with the under brace attached to the angle or bend of the short arm of said lever.

BENJAMIN F. MILLER.

No. 6811.—*Improved arrangement of the Lever half beam of Steam Engines.*

What I claim as my invention and desire to secure by letters patent, is the arrangement of a horizontal cylinder, with a lever half beam, having its fulcrum at its lower end, and connecting rod attachment at its upper end, with crank and shaft above the cylinder, substantially in the manner and for the purposes herein before described.

WM. A. LIGHTHALL.

No. 6812.—*Improvement in Blocks for holding Daguerreotype Plates.*

What I claim as new and of my own invention and desire to secure by letters patent, is the application of the cross piece *b*, and lip clips 5, 5, with the thumb screw *c*, to hold the plate to be polished on the face of the plate *a*, the plate below the centre 4, of the thumb screw *c*, being fitted to receive through an aperture in the centre of the screw, a point, or stud, on a lever by which the plate *a*, can be moved in alternate and opposite directions across the face of a rotary chuck for the purpose of polishing or cleaning daguerreotype plates, substantially as described and shown.

ALEXANDER BECKERS.

No. 6813.—*Improvements in Looms.*

Having thus described the construction and operation of my loom for weaving tubular webs, what I claim therein as new and desire to secure by letters patent, is straining the several divisions of the warp from the same yarn beam equally, by passing the adjacent yarns of the respective sheds over the same whip roll, the extreme yarns being passed over a second whip roll, substantially as herein described.

I likewise claim varying the closeness of the texture of the web, by varying the speed of the rolls (H, H′,) by which it is drawn through the loom, by devices substantially such as herein set forth.

AUGUSTUS FAULKNER.

No. 6814.—*Improvement in Invalid Bedsteads.*

What I claim as my invention and desire to secure by letters patent, is the use of the lever to alternately raise and depress the sliding boxes, when these boxes are combined with the horizontal drawer, for alternating, placing the chamber and cushion under the permanent opening in the mattress, as described and represented.

JOHN KARNEY.

No. 6815.—*Improvement in Apparatus for Distilling Sea Water.*

What we claim as our invention and desire to secure by letters patent, in the before described apparatus for the distillation or production of fresh water on board of ships or other vessels, is connecting the steam boiler with the condenser, by means of a flexible pipe, substantially as described, in combination with the valve joint connection of the bonnet or steam dome covering the band hole in the top of the boiler, substantially as described, whereby this connection is rendered of manifold uses, as described.

We also claim condensing the steam, by passing it in a space between two vessels, the inner one kept cool by a current of water, and the external one surrounded by woollen or other porous substance, to be kept in a moist state, to condense the steam by the evaporating effect of the atmosphere on the moistened surface surrounding the outer case, substantially as described, whereby the apparatus is especially adapted to very low latitudes, as described.

And, finally, we claim the feed pipe for supplying water to the condenser, and for feeding the boiler, substantially as described, in combination with the cistern that conducts the feed water to the boiler, and provided with a float for regulating the flow of water from the feed pipe, substantially as described, whereby the apparatus is rendered self-feeding without liability of derangement, as described.

R. B. FORBES.
J. ERICSSON.

No. 6816.—*Improvement in Surfacing Floor Oil Cloth.*

Most of the parts employed by me in these arrangements and operations are not new in themselves, having been before employed separately for many purposes; therefore, I do not claim any of such parts herein so employed by me, irrespective of the manner in which I use them; but I do claim as new and of my own invention and desire to secure by letters patent of the United States, to be issued to James D. Sparkman and Melville Kelsey, as my assignees, as follows:

The application of the fixed suspending timbers, or slotted railways *d*, and carriage *g*, with the changeable slotted timber or railway *e*, to carry and adjust the working parts at different heights and positions on the grounding frames, conjointly with the arrangements described and shown, by which the arms *m*, *m*, and a plurality of surfacing blocks *p*, *p*, are applied to smooth the face of the canvas A, A, by the power of a man or men, operating through the crank *z*, and cylinder *s*, and pinion *t*, in alternating right lines on the rack *v*, and kept in place by the collar *u*, carriage *x*, and rollers *y*, *y*, and the employment, conjointly with the foregoing parts, of the blocks *q*, and *r*, and screws 4, 4, to adjust the pressure of the blocks *p*, *p*, on the face of the canvas operated on; the whole constructed, arranged and operating substantially in the manner and for the purposes herein described and shown.

WILLIAM BERRY.

No. 6817.—*Improved Circular Saw-Set.*

What I claim as my improvements and desire to secure by letters patent, are the diagonal and angular adjustable slotted gauges attached to the set, in the manner and for the purposes herein described.

ELHANAN WINCHESTER SCOTT.

No. 6818.—*Improvement in Locomotives for ascending Inclined Planes.*

Having thus described the construction and operation of my improved locomotive, what I claim therein as new and desire to secure by letters patent, is a spring or other equivalent device for holding a self-adjusting toothed driving wheel in gear with a toothed rack, substantially as herein set forth.

I likewise claim the employment of steam acting on the piston of a supplementary cylinder, to throw an adjustable toothed driving wheel in or out of gear, with a stationary rack, and at the same time to operate as a spring to hold it in either position, substantially as herein set forth.

ANDREW CATHCART.

No. 6819.—*Improvement in Apparatus for holding Daguerreotype Plates.*

We do not claim to have invented a vice for this or any similar purpose; nor do we claim to have invented any of the parts herein described, as all are well known,—

But we do claim as new and of our own invention, and desire to secure by letters patent of the United States, the application of the cam 8, acting to depress the rebated chop 6, on the plate 9, beneath, conjointly with the screw 7, to adjust the parts for the purpose of holding the plates while polishing the same, substantially as described and shown.

WILLIAM LEWIS.
W. H. LEWIS.

No. 6820.—*Self-adjusting Valve for Regulating the admission of Air to Fan Blowers.*

What I claim as my invention and desire to secure by letters patent, is the combination of the case of resisting plates D, and mortised end plate B, with the turning valve E, F, when made with radial wings E, and segmental out off plates F, retained in its required position by a spring, or by a weight, cord and pulley, or other mechanical equivalent; said valve operating substantially in the manner and for the purposes herein set forth.

FRED'K S. BARNARD.

No. 6822.—*Improvement in Gearing.*

What I claim as my invention and desire to secure by letters patent, is the mode of transmitting motion from the pulleys of a double geared lathe, or turning engine, to the main shaft or arbor A, of the same, with a decreased speed and a corresponding increase of power by means of the eccentric *c*, secured on the inside of the large hollow pulley B, and turning within the large wheel C, arranged eccentric with the shaft and having cogs *e*, on the inner periphery of the projection *d*, at its outer edge, meshing in gear with a circular cogged ring F, secured to the inner surface of the detached face plate *i*, and held stationary by the connecting rod or plate G, and also the hub D, keyed to the shaft or arbor A, having arms *f*, made convex on their extremities and concave on their sides, so as to form circular openings *g*, or spaces, when inserted in their places, in which the bolts or pins E, revolve in their passage around the axle or arbor, alternately striking the concave sides of the arms, and causing them to revolve slowly, in such a manner as to cause the large cog wheel C, to revolve around the cogged ring F, just so many

cogs as it possesses more than said ring, at every revolution of the eccentric *c*, and a proportionate slow speed to be given to the shaft or arbor A, as herein set forth, or in any other mode substantially the same.

BENJAMIN ARNOLD.

No. 6822.—*Improvement in Feed Apparatus for Shingle Machines.*

I claim a *self-adjusting feed motion* produced by the interposition of friction between metallic surfaces in the connections of the parts of the driving gear, or any two of those parts, by means of a *friction strap*, as described, or any analogous mode, which shall allow the adaptation of the speed of the carriage holding the material to be cut, to the resistance the material affords to the saw, especially in cases where unusual and temporary obstacles, such as knots, &c., interpose, which might otherwise cause the destruction of the teeth of the saw and other parts of the machine—a very important practical result of the adjustment being that it produces smoother sawing in stuff of irregular texture than machines now do.

HENRY BURT.

No. 6823.—*Improvement in Looms.*

Having thus fully described my improved loom, what I claim therein as new and for which I desire to secure letters patent, is—

First. The combination of the jacquard cylinder with the depressing frame, and fingers for the purpose of working the uprights (*f*,) thereby through the medium of the fingers, as herein set forth.

Second. I claim the combination of the lifting and depressing frames with the crank shaft, by means of a rock shaft connected with said frames by connecting rods, and worked by the crank shaft with which it is connected by a rod for that purpose.

Third. I claim the frames for suspending and carrying the harness in combination with the marches *e*, and the apparatus for working the same, as above specified.

Fourth. I claim the combination of the hooks for lifting and depressing with the marches and harness frames, without the aid of cords, as herein set forth.

Fifth. I claim the construction and application of the adjustable crank by which I effect an adjustment in all directions in a simple and convenient manner.

HENRY BACHOFNER.

No. 6824.—*Improvement in Stoves.*

Having thus fully, clearly and exactly described the nature, construction and operation of my invention and improvements in stoves or furnaces for heating, cooking or other purposes, for which equivalent combinations are suitable; what I claim therein as new and desire to secure by letters patent, is concentrating the issue of the gases, evolved during combustion, as they pass from the fire chamber into a reverberating chamber, and are at that point commingled with jets of air, the said issue or orifice being in the proportion of a circle of one third (or less) the diameter of the reverberating chamber into which it opens, and combined with an opening for the discharge of the reverberated current, as illustrated in fig. 1, by the fire bowl *(d,)* orifice *(h,)* drum *(k,)* and opening *(q,)* and for the purposes set forth.

I also claim the disc *(o,)* inserted immediately above or on a level with the top of the opening *(q,)* for the exit pipe, and having a central orifice *(m,)* of suitable diameter, and perforations *(n,)* arranged as described and for the purposes set forth.

I also claim the disc *(o,)* constructed and described, in combination with the orifice *(h,)* as described and for the purposes set forth.

I also claim locating the opening *(q,)* for the exit pipe, as described, in combination with the disc *(o,)* and the orifice *(h,)* in the manner and for the purpose set forth.

JAMES COLE.

No. 6825.—*Improvement in keeping Ledger Accounts.*

Having thus described my invention, I claim the box, with the plate or false bottom *a*, constructed with the slits for the reception of the cards, as represented in figure 1, the said cards being arranged in the manner represented in figure 1, with two alphabetical indexes arranged at right angles to one another, as a direct index reference to the name and surname of individuals with whom accounts are kept.

I also claim the card index formed with the shoulder *b*, to suspend the card in the slit of the plate or false bottom *a*, and to form a part of said card to pull it out and insert it in the slit, as herein represented and described.

ANDREW J. FOLGER.

No. 6826.—*Improvement in Barrel Carriages.*

What I claim as my invention and desire to secure by letters patent, is the combination of the arcs D, and hinged legs F, F', with a barrel carriage, substantially in the manner and for the purpose herein set forth.

WILLIAM FURLEY.

No. 6827.—*Improvement in Mills for Grinding.*

Having thus fully described and represented the nature and operation of my improvements in flouring mills, what I claim therein as new and desire to secure by letters patent, is—

First. Surrounding the feeding tube and cup with a shield, constructed and attached as described, or in any analogous manner, and for the purpose described, viz: preventing the blast of air from distributing the regularity of the feed, and deflecting and directing the same vertically downwards, so as to cause it to force the grain between the grinding surfaces of the stones.

Secondly. Inserting and extending down into the eye of the runner a cylinder to which the balance rive is permanently attached or cast, (whether made with or without a metallic back and hoop for the stone,) attached at its upper portion to the stone, forming with the eye of the runner stone, at its lower portion, a recess into which the stationary cylinder of the bed stone projects, and furnishing an attachment for the balance rive elevated above the centre or face of the runner, the whole being arranged as described, or in any analogous manner, and for the purpose described, viz: preventing any grain jumping over the top of the stationary cylinder that stands on the bed stone, and hanging against or choking the eye of the runner stone, directing the air blast vertically downwards, in connection with the cylindrical projection of the shield; and, most importance of all, affording an attachment for the balance rive above the level of the grinding surface of the runner, thus leaving the same undiminished and unbroken, and avoiding the usual interference of the balance rive and driver with the feed, or its tendency to hanging in the eye of the runner stone if the stationary cylinder on the bed stone is not used.

Thirdly. Attaching to the bed stone a cylinder resting on suitable feet, and within the sweep of the eye of the runner, the cylinder or circular partition being of such diameter and elevation as fit it to project up into the recess formed by the eye of the runner stone and the cylinder which is inserted and attached therein, and to allow the same to revolve around and within it, the whole being arranged as described, or in any analogous way, and for the purpose described, viz: preventing the grain coming into contact with or being carried around by the revolving runner, and thereby hanging in and choking the eye of the same, the grain not having the same tendency to hang on the vertical wall of a stationary cylinder, and also continuing the vertical and downward direction given to the blast until it escapes between the stones.

Fourthly. In combination with the closed air chamber for passing the blast between the stones, dressing the inner and leaving without dress the outer portion of the area or face of the stones, say from the circle described by the eye of the runner, dressing one half the radial distance, more or less, thence out and leaving the balance all land.

Fifthly. The combination of the shield (*i* and *j*,) the cylinder (*n*,) and the cylinder (E,) arranged and constructed as described, or in any analogous way, and for the purpose described.

LEWIS FAGIN.

No. 6828.—*Improved Weather Strip.*

I claim the hinge, constructed as set forth in the above specification, in combination with the mode of stopping the same from shifting its position horizontally to the right or left hand when in ordinary use.

I also claim the method of detaching the lower strip, whenever desired, by the method in this specification described, in combination with the mode of keeping the lower strip suspended above the sill, as herein above set forth.

EBENEZER GARNSEY.

No. 6829.—*Improvement in Planing Machines.*

Having thus described my invention and the means of operating it, what I claim therein as new and desire to secure by letters patent, is graduating the pressure applied to the lumber on the rest, in proportion to its thickness, substantially as herein set forth.

HUGH JETER.

No. 6830.—*Improvement in Flour Packers.*

Having thus fully described my improved apparatus and its mode of operation, what I claim therein as new and for which I desire to secure letters patent, is—

First. The packing apparatus, consisting of a combination of the tube *b*, and inclined blades for condensing the flour, and retaining it while moving the barrel, substantially in the manner and for the purposes set forth.

Secondly. I claim the hollow shaft for expelling the air from the barrel in packing, as above described. I also claim the self-acting clutch, in combination with the packing apparatus, in the manner above made known.

NATHAN KINMAN.

No. 6831.—*Improvement in Fences.*

Having thus fully described my invention, what I claim and desire to secure by letters patent, is the mode of fastening pickets or paling fences by means of a series of links *a*, formed on the wire for receiving and retaining the pickets, the ring *d*, for securing the wire to posts, and the hooks *b* and *c*, for connecting the pieces of wire together in a line of fence, in the manner substantially as herein set forth.

LUCIUS LEAVENWORTH.

No. 6832.—*Improvement in Power Looms.*

Having fully described the construction and operation of my improvements in power looms, what I claim and desire to secure by letters patent, is—

First. The cam r', on the fast pulley E, in combination with the lever or click q', the crooked rod q, the coil spring t, the catch s', and the lever d, constructed and arranged in the manner substantially as described, for the purpose of arresting the motion of the loom at pleasure, as herein set forth.

Second. I claim the mode of stopping the action of the loom instantaneously by a self-acting operation, when the shuttle gets caught in the race way of the lathe, by means of the chisel o', on the rod e, catching against the head S, on the crooked rod q, and projecting the click or break q', against the cam r', on the fast pulley E, in the manner substantially as herein described.

Third. I claim the combination of the vibrating lever or treadle g', and the connected spring g, with the cord or rod f, the vibrating fingers o, o, on the rod e, and the fenders p, p, for the purpose of arresting the momentum of the shuttle as it enters the boxes, the cam h, on the shaft L, operating and giving motion to the fingers, in the manner substantially as described.

ROGER LIGHTBOWN.

No. 6833.—*Improvement in Stoves.*

Having thus fully, clearly and exactly described the nature, construction and operation of my invention, what I claim herein as new and desire to secure by letters patent, is attaching the exit pipe (u,) to the funnel shaped tube or shute (j,) so as to collect and transmit down into the fire the soot precipitated during the passage of the results of combustion to the exit pipe, substantially after the manner and for the purpose herein fully described and represented.

ADOLPHUS LOTZE.

No. 6834.—*Improvement in Mills for Grindiug.*

We do not claim to have invented a cup to intervene between the bail spindle and fixed centering cup; but what we do claim as new and of our own invention, and desire to secure by letters patent of the United States, is—

First. The construction and application of the cup b, with edges 4, 4, to receive the bail and spindle, preventing the ends of the spindle from separating, thereby forming a more permanent attachment to the bail.

Second. The construction and application of the cylinder e, with screw flanches 8, 8, outside and spiral plate 6, inside, forming a screw to force the grain between the stones, and also to prevent its jumping out of the eye, as the running stones and bail give the grain, or other material, a rotary motion *against* the direction of the stationary screw flanch, substantially as described and shown.

DAVID MARSH.
ELI B. NICHOLS.

No. 6835.—*Improvement in Wash Boards.*

Having thus fully described the nature and effect of my invention, I wish it to be distinctly understood that I do not claim any of the several parts composing a wash board made of sheet metal and wood; but that which I do claim as my new and useful improvement in the mode of manufacturing such wash boards, and for which I ask letters patent, is incising with the edges of the sheet metal, (prepared and crimped as described,) the legs or the legs and body board by the suitable application of pressure thereto, thereby fitting and attaching the one to the other at one operation, and with a comparatively water tight joint.

ORRIN RICE.

No. 6836.—*Improved Means for Working Sails.*

I do not claim to have invented any of the parts herein described, as separately from the manner in which it is employed, no one part is new; but I do claim as new and of my own invention, and desire to secure by letters patent of the United States, the attachment of a rope 8, to the bolt rope of a sail to act as a down haul in lowering, and to sheet the sail home when hoisting, such rope passing by sheaves, or blocks, or in any convenient manner from one end of the boom to the other, so that it operates to release the cringle and relieve the sail when lowering, and replace the cringle, and sheet home the sail when hoisting, substantially as described and shown.

WILLIAM A. ROSS.

No. 6837.—*Improvement in Electro-Chemical Telegraphs.*

We do not claim as our invention the train of wheels constituting the motive part of the marking instruments; neither do we claim to confine ourselves to any particular form of battery, or other generator of electricity which may be of any suitable form, several of which are well known and in common use.

We desire it to be understood that what we claim as new and of our invention, is—

Firstly. The mode of arranging the several parts of our marking instrument for electro-chemical telegraphs, substantially as herein before described.

Secondly. We claim the mode of adjusting a style, or point-holder, as herein before described and shown, so as to afford a ready and convenient mode of regulating the pressure of the style or point upon the surface of the chemically prepared fabric.

Thirdly. We claim the mode of applying the weight Q, for the purpose of regulating the pressure, as herein described and shown.

Fourthly. We claim the mode of arranging the marking and transmitting instruments, wires and batteries in a single circuit, and in branch circuits connected therewith, so that a copy of a message sent from any one station, may

be marked upon the chemically prepared paper or other fabrics at one or any desired number of stations in communication therewith, and also, if required, at the transmitting station, without requiring the use of any secondary current.

ROBERT SMITH.
ALEXANDER BAIN.

No. 6838.—*Improvement in Straw Cutters.*

What I claim as my invention and desire to secure by letters patent, is the operation of cutting and comminuting straw substantially as herein described and represented. JONATHAN SULLIVAN.

No. 6839.—*Improvement in Springs for Carriages.*

I do not claim U springs in combination with elliptic ones; nor do I claim a spring pearch or reach. But what I do claim as my invention and desire to secure by letters patent, is the combination of the adjustable U springs with the bent spring reach, by bolting one end of said springs to said reach, and connecting the bend of said spring to the bent part of the reach by an adjustable link or clasp in the manner and for the purposes above set forth

WM. S. THOMAS.

No. 6840.—*Improvement in the mode of making Toothed Cylinders.*

I am aware that teeth have been fixed in solid blocks or cylinders of metal, and by boring holes in said cylinders and inserting and confining the teeth therein. Besides the difficulty of keeping the teeth in their proper places when so applied, such a method of making a cylinder of teeth becomes very expensive in comparison with that adopted by me. I am also aware that lead or other fluid metal, or other material in a molten or liquid state has been cast around one or more articles for the purpose of holding them in place. I do not therefore lay any claim to such modes or contrivances in the abstract; but what I do claim as my invention is the improvement in the mode of setting and adjusting the teeth of toothed cylinders, made substantially as hereinbefore described, the said improvement consisting in the employment of the screw A, in combination with the external tube of paper or metal *b*, the said screw not only enabling me to set the teeth in a helix line, which presents great advantages in their operation, but to readily withdraw it (the screw) at the proper time and for the introduction of the cylinder B, as described.

J. L. TUTTLE.

No. 6841.—*Improvement in Transverse Callipers.*

What I do claim as my invention and desire to secure by letters patent, is the transverse callipers, having legs so formed and connected as to be inserted into the bung of a cask to ascertain its length from head to head, or its width from side to side, substantially as herein described.

W. J. VAN NESS.

No. 6842.—*Improved method of flooding and entering Powder Magazines.*

What I claim as my invention and desire to secure by letters patent, is attaching to and combining with the known magazine (having its ejection and injection pipes for flooding and continuing a circulation of cold water through it) and the governing cocks connected together; a connecting piece to be effected by *heat*, without necessarily coming in contact with *fire*, this connecting piece being governed by a spring when not caused to operate; and being capable by the action of heat to flood the magazine. The whole being arranged or constructed substantially as herein more fully described. I also claim attaching and combining with the magazine a double tube or equivalent arrangement, by which articles may be conveyed into or from the magazine without in any way exposing the interior of the magazine to fire from without, by which several arrangements a perfect security is effected against firing the magazines of vessels of war, all of which is fully described herein.

CHAS. W. COPELAND.

No. 6843.—*Improvement in Lathes for turning.*

What we claim as our invention and for which we desire to secure letters patent, is the combination of the sliding cutter stock M, the friction wheel N, and two or more patterns, J, K, the spindle *o*, and the changing lever *p*, *p*, substantially as herein described, and for the purpose set forth.

ALLEN GOODMAN.
HAMMOND DOANE.

No. 6844.—*Improved arrangement of engine for useing Steam expansively.*

I do not wish to limit myself to the precise proportions or locations of the crank shaft, as these may be greatly varied within the principle of my invention without effecting the result except in degree. Nor do I wish to limit myself to the employment of all my improvements in connection, as important results can be obtained by either one of them separately, as for instance, obtaining an equal or nearly equal mechanical force on the first and second halves of the semi rotation of the crank when using steam expansively, by the principle involved in changing the position of the crank shaft, relatively to the axis of vibration of the beam, may be advantageously employed with only one engine for many purposes. The use of two engines with the cranks on the same shaft and on opposite sides of the centre, may be advantageously applied to obtain a more regular mechanical action on the crank shaft, by the use of expansive steam on two ordinary engines with or without the beams, without the use of the first or third branch of my invention.

What I claim as new is placing the axis of the crank shaft or single-acting beam engines in which the steam is applied expansively, nearer to a line parallel to the axis of the cylinder, and passing through the axis of vibration of the beam, on the principle herein specified, and for the purpose of obtaining a more regular mechanical action on the crank, by the application of the expansive principle of steam, as described.

I also claim the employment of two single action expansion crank engines, with their cranks on one and the same shaft, and on opposite sides of the centre, that is, at an angle of 180°, substantially as described.

And I also claim in expansion engines having two cylinders with pistons moving in opposite directions, and connected with cranks on opposite sides of the centre, in one of which the steam acts by expansion alone, having one end of the large or expansive cylinder at all times in connection with the condenser, and the other alternately in connexion with the condenser, and with the steam end of the smaller cylinder, that the large piston during its return stroke may have a vacuum on each side, as described, when this is combined with the smaller cylinder connected with the boiler, and so arranged as to have both ends in connection with one end of the larger or expansive cylinder, so that when the piston of the smaller cylinder is acted upon on one side by the

steam, there shall be a vacuum on the other side, and when the steam is acting by expansion on the larger piston, it shall be in connexion with both ends of the small cylinder, as described. I do not wish to be understood as claiming the mode of connecting the small and the large expansion cylinders when so arranged that the two pistons are connected and move together, and in the same direction, for this was known before, in what is known as the Leghwater engine, but I do claim it when arranged as and in the combination herein specified.

And thirdly, in combination with a two throw crank shaft having the two cranks on opposite sides of the centre, the making of the second of the two engines so connected, of greater capacity. J. ERICSSON.

No. 6845.—*Improvements in Looms for weaving Figured Fabrics.*

Having thus fully described my improvements in working heddles, what I claim therein as new and for which I desire to secure letters patent, is first, operating the heddle frames by the direct application of a cylinder to them, substantially in the manner and for the purpose set forth; secondly, I claim the mode of changing the pattern by having several patterns on one cylinder, and at each operation turning the cylinder so far as to pass over the intermediate patterns, and bring the desired one under the heddle frames, as above described; and I also claim the apparatus for turning the cylinder, substantially as herein specified, whereby the cylinder can be turned through a greater or less arc, as may be required, substantially as herein described.

RICH'D GARSED.

No. 6846.—*Improvement in Mowing Machines.*

What we claim as our invention and desire to secure by letters patent, is the construction and use of the mortise or guide slot (4,) in combination with that for the axle of the driving wheel, for the purpose of allowing the wheel or thills, or both, to rise and fall without elevating or depressing the blades.

DANIEL K. HARRIS.
JOHN K. HARRIS.

No. 6847.—*Improvement in Corn Shellers.*

What we claim as our invention and desire to secure by letters patent, is constructing one or more of the bars of the concave in hinged sections (*h h h*,) which turn in an arc whose axis is at right angles to that of the cylinder, whereby the ears are subjected to opposite and oblique rubs, which facilitate the stripping of the grains from the cobs.

Second. Feeding the corn into the throat of the sheller by means of a fluted roll (C,) which delivers the ears with their axes parallel to that of the cylinder, whereby the breaking of the cobs is prevented, and the shelling is expedited.

Third. The employment of the hinged gate (D,) to prevent the ears from being fed into the sheller either endwise or too rapidly.

DARIUS W. HARRIS.
EGBERT P. CARTER.

No. 6848.—*Improvement in Winnowing Machines.*

Having thus fully described my improved seed cleaner, what I claim therein as new, and for which I desire to secure letters patent, is the combination and arrangement of the horizontally sliding screen and shaking shoe, operated in the manner and for the purposes set forth.

A. J. HOWELL.

No. 6849.—*Improvement in Regulators.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of the radial arms (*a*,) and arms C, arranged in pairs, spiral springs D D′, surrounding the same, fan wings F, and segments E, of a rim of circular curb, for regulating the speed of machinery, substantially in the manner herein set forth.

J. F. MASCHER.

No. 6850.—*Improvement in Harness Hames.*

What I claim as my invention and desire to secure by letters patent, is the giving the inner edges of harness hames a concave form, for the purpose of enabling them to be fitted with much greater accuracy to the roll upon the collar, and thereby securing them against displacement, substantially as herein set forth.

CHARLES POPE.

No. 6851.—*Improvement in Rice Hullers.*

What we claim as our invention and desire to secure by letters patent, is—

First. The employment of rows of brushes on a rotating stock, in combination with a surrounding wire gauze cylinder, when the said rows of brushes or rubbers are made with their forward edges bevelled, or with the equivalents thereof, substantially as described, whereby the entrance of the rice or other grains between the brushes and the surrounding cylinder is insured, as described.

Second. The rows of inclined feeders or conductors, in combination with and interposed between the rows of brushes or rubbers, substantially as described, for the purpose of conveying the rice or other grain through the machine, as described; and this is claimed in contradistinction to inclined feeders or conveyors used at the end of the brushes.

Third. The rubbers made of India rubber at the feeding-in end of the machine, in combination with the brushes, substantially as described, for the purpose of hulling the grain, preparatory to the operation of the brushes.

Fourth. The polishers, made of lamb's wool, or other equivalent substance, at the delivery end of the machine, in combination with the brushes, substantially as described, for the purpose of polishing grain preparatory to its delivery, as described.

Fifth. Connecting the brushes with the stock, by adjustable means, substantially as described, for the purpose of adjusting the periphery of the brushes to the wire gauze cylinder, as described.

And, finally, making the inclination of the face of the feeders or conveyors adjustable relatively to the axis, substantially as described, for the purpose of regulating the passage of the grain through the machine, substantially as described.

D. H. SOUTHWORTH.
JAMES R. HITCHCOCK.

No. 6852.—*Improvement in Pendulum Balances.*

Having thus fully described my improvements in pendulum balances, what I claim therein as new and for which I desire to secure letters patent, is the combination of a pendulum balance, having a wing or fan attached thereto, to prevent its vibrations, substantially as described, with the adjustable counterbalance platform for weighing, interposing the chain and cam in the manner set forth.

I claim, also, in combination with the above apparatus, the scale for small weights, so arranged in connection with the levers of the platform scales as to have the same index indicate the weight of articles placed on either the large or small balance.

And, lastly, I claim the arrangement of the platform levers, both working in one direction, with the adjustable weight appended thereto.

ELNATHAN SAMPSON.

No. 6853.—*Improvement in Seed Planters.*

What I claim as my invention and desire to secure by letters patent, is—

The combination of the spring catch *f*, with the levers *d*, substantially in the manner and for the purpose herein set forth.

The combination of the device (consisting of the rod *h*, connected with the short arm of the lever *d*,) for opening and closing the register *g*, with the devices for gearing and ungearing the seed roller, and raising and depressing the drill teeth, as described.

JOHN W. SHERMAN.

No. 6854.—*Improvement in Grease Boxes for Axles.*

What I claim as my invention and desire to secure by letters patent, is the auxiliary oil cup, in combination with the cup which holds the cotton waste or other fibrous substance under the journal, when said combination is effected by means of the partitions, substantially as herein described.

JOHN M. SMART.

No. 6855.—*Improvement in Carpet Cleaning Machines.*

What I claim as my invention and desire to secure by letters patent, is the application of the recoil strokes of elastic rods from tension, as described, to successive portions of a carpet or other fabric, moved over rollers in sliding frames, made adjustable by means described, by means of which the carpet or other fabric is rapidly and smartly beaten, and thereby cleansed from its dust and other impurities, and otherwise improved.

JOSEPH WENTWORTH.

No. 6856.—*Improvement in Tailors' Measures.*

What I claim as my invention and desire to secure by letters patent, is the arms B and C, in the symetrical rule, in combination with the dial plates *f* and *g*, to which they are attached by pivot joints, and herein described and represented.

JAMES M. WHITHAM.

No. 6857.—*Improvement in Apparatus for raising and carrying Water.*

What I claim as my invention and desire to secure by letters patent, is the arrangement and operation of the cord *l*, that is to say, passing it round

a pulley at or near the highest part of the track, substantially as herein set forth, whereby the carriage can surmount any elevation intervening between the well and the point where the water is to be delivered, without the use of a return cord.

J. D. WILLOUGHBY.

No. 6858.—*Improved File Supporter.*

What we claim as our invention and desire to secure by letters patent, is the combination of the yielding guide rolls for supporting a hand file during the operation of sharpening the teeth of saws, with the adjustable clamp stock on which they are mounted, substantially as herein set forth.

JEROME B. WOODRUFF.
BENJAMIN M. TOWNSEND.

No. 6859.—*Improvement in Fire Engines.*

What I claim as my invention and desire to secure by letters patent, is the combination of the horizontal vibrating brakes G H, with the engine A B C D, said brakes being so constructed and arranged that any desired number of hands may conveniently apply their united power to the alternate action of the pistons, whilst standing upon the ground in parallel rows, at right angles to the sides of the engine. The handles or propelling rods being so connected with the brakes that they can be brought parallel with and connected to them, so as not to extend beyond the sides of the engine, when the latter is not in use; by which the advantages enumerated in the foregoing specification are obtained.

JOHN B. TARR.

No. 6860.—*Improvements in Hemp Machines.*

Having thus fully described my improvement in breaking and cleaning hemp and flax, and other fibrous substances, what I claim therein as new and for which I desire to secure letters patent, is the combination of the grooved rollers, brake and scutchers, or scrapers, substantially in the manner and for the purpose set forth.

I also claim the scrapers when employed with any other feeder that shall hold the material firmly while being scraped.

JAMES ANDERSON.

No. 6861.—*Improvement in Pessaries.*

What I claim as my invention or improvement in the pessary, and desire to secure by letters patent, is the attachment of two stems by hinges to a circular rim, and which two stems may be combined into one stem with two branches by means of a tube or socket to be slid upon the lower end thereof, in the manner herein before fully set forth.

JOSIAH B. ANDREWS.

No. 6862.—*Improvement in Portable Water Closets.*

Having now described my improvements in the construction of water closets, I will proceed to state what I claim and desire to secure by letters patent. What I claim therefore, is the construction and use of the arrangement of levers G H I J & K, in combination with and operated upon by the foot and seat boards of a water closet, for the purpose of opening the pan M, in the lower basin or trap of a water closet, and regulating the supply of water to

the closet reservoir, also the construction and use of the levers S^1 S^2 S^3, and weighted lever T, in combination with the foregoing arrangement of levers, and operated upon by the seat board for continuing the operation of supplying the water to the basins from the closet reservoir.

CHARLES C. BIER.

No. 6863.—*Improvement in Cast Iron Car Wheels.*

What I claim as my invention and desire to secure by letters patent, is the combination of the curved hollow arms B, with the hollow rim, the A, made semicircular on its inner part and hollow curved hub D, enlarged and forming a continuation of the faring of the inner ends of the arms, for causing all the parts of the wheel to accommodate themselves to each other in shrinking or cooling, substantially in the manner and for the purpose herein set forth.

THOMAS S. BOURSHETT.

No. 6864.—*Improvement in Binder Pullies for Belts and Brakes.*

Having thus fully described my improvements, what I claim as my invention and for which I desire to secure letters patent is—

First. To communicate power to machines used for extracting liquids from other matter by means of a moveable binder pulley and a slack belt, the binder pulley being pressed upon the belt by means of a shifting weight, as herein described.

Second. To attach to the same part to which is connected the binder pulley, the friction strap or brake, so that by the same movement that the binder is taken from the belt, the brake is brought to act upon the machine, to stop it by the means herein described.

MERTOUN C. BRYANT.

No. 6865.—*Improvement in Ice Cream Freezers.*

Having thus fully described the nature, construction and operation of my invention—

What I claim therein and desire to secure by letters patent, is freezing cream or other liquids by forcing through them currents of air chilled by passing them through chambers artificially cooled, substantially as set forth.

G. COFFEEN, Jr.

No. 6866.—*Improvement in Seed Drills.*

What I claim and desire to secure by letters patent, is the controling of the springs M, by means of the ring K, in the manner and for the purpose herein set forth.

D. CUSTER.

No. 6867.—*Improvement in Curling Hat Brims.*

I do not herein claim to have invented the steam heater C; nor to be the first who has employed the shaping cloth *b*, with the spring 3, and cord 4, nor do I claim to have invented any one of the mechanical parts described as used herein, irrespective of the manner, in which I have adapted, applied or combined them for these purposes, except the entire curler piece *c*, which I have been the first to invent and use.

But I do claim as new and of my own invention, and desire to secure by letters patent of the United States—

First. The exclusive application of a changeable curler or former piece *c*, that entirely surrounds the hat crown, and acts on the whole of the brim; and the combination therewith of the pieces *d d*, yoke *e*, swinging standard *k*, cam *o*, and lever *p*, to hold a hat in such a manner that the workman may iron and finish the curl on the edges of the brim at one operation, effected substantially as described and shown.

Second. The combination with the foregoing parts of the winch *h*, lines 7 7, and hooks 8 8, to draw or turn the cloth *b*, on and over the edges of the hat brim, and turn the edges of the hat brim over the edges of the curler piece *c*, and hold them there while the workman irons them, so as to set them in the required form, substantially as described and shown.

Third. I claim the application of the metal cooler piece *r*, for the purpose of cooling the hat brim so rapidly that the brim shall not have time to warp or change the form previously given to it, the shape of such cooler being conformable to the size and shape of the hat brim, so as to present an even bearing to the under side of the hat brim while cooling, substantially as described and shown.

FRANCIS DEGEN.

No. 6868.—*Improvement in Regulators for Water Wheels, &c.*

I do not claim the conical drums, endless belt and governor, these having been long known as a means of changing speed; but I claim as my invention the employment of these or analogous arrangements in connection with the loose cog wheel C, herein described, as the means of causing the revolution of said cog wheel to exceed or fall short of the revolution of said water mill or first mover, whenever such water mill or first mover shall exceed or fall short of its proper speed; the consequence of this variation through the agency of the screw K, bell crank *o h*, and moveable plate (which parts I also claim in combination with those above mentioned) being either to enlarge or contract the jet apertures, and thereby to increase or diminish the speed of such water mill or first mover, in accordance with the necessities of the case; and this I claim under an arrangement substantially the same with that herein fully set forth, not intending however, to limit myself to the particular form and connection of the individual parts, but to vary these as I may find expedient, whilst I attain the same end by analogous means.

JAMES FINLAY.

No. 6869.—*Improvement in Machinery for turning Right and Left Lasts.*

We do not claim to be the original inventors of the principle of cutting and turning lasts or other irregular formed bodies, by means of a series of revolving cutters, guided by a pattern or model corresponding in form with the article to be cut or turned, as this principle is common property, and has been for many years; but what we do claim as our invention and desire to secure by letters patent, is—

First. The mode of cutting a right and left last (or other article) simultaneously from a single reverse pattern and two blocks of wood, by the before described combination and arrangement of a reverse model tracer wheel and single wheel of rotary cutters, moving in opposite directions, the tracer wheel being in contact with the reverse model, whilst the cutters turn between the two pieces of wood to be turned into a right and a left last, the latter turning simultaneously in opposite directions, inward or outward against the cutter wheel.

CHARLES HARTSHORNE.
WM. B. SHAW.

No. 6870.—*Improvement in Connecting Hubs to Axles.*

What I claim as my improvement and desire to secure by letters patent, is the introduction of the rod *f*, with the nib *e*, working into the cavity K, in the manner and for the purposes herein set forth.

JOHN KELLOGG.

No. 6871.—*Improved Safety Sliding Breech Fire Arm.*

What I claim as my invention and desire to secure by letters patent, is first, the method of locking the breech pin when inserted to prevent it from turning, by means of the sliding bar, substantially as described; and this I also claim in combination with both or either of the methods of securing the breech pin by the screw thread and the inclined face of the breech pin tube, substantially as described.

Second. Combining with the sliding breech pin and the discharging punch which slides therein, or the carrier thereof, the spring catch for holding the punch back during the operation of loading, substantially in the manner and for the purpose specified; and I also claim this method of holding the discharging punch in combination with the connection of the punch or the carrier thereof, with the trigger, substantially in the manner and for the purpose specified.

Third. The combination of the sliding bar, which locks and unlocks the breech pin, with the catch of the breech pin, which holds and liberates the discharging punch, substantially in the manner and for the purpose specified.

C. HARTUNG.

No. 6872.—*Improved means of changing the combination in Revolving Tumbler Locks.*

What I claim as my invention is hanging the series of rotating tumblers in a hinged or vibrating frame, their outer periphery being provided with cogs which gear into the cogs of the series of tumblers connected with the stationary lock plate, so that when the said frame is elevated, the tumblers of the other series will be free to turn, in order to suit any variation in the set of the key.

LEWIS LILLIE.

No. 6873.—*Improved Method of fitting the Heaving Socket and Head of Windlasses.*

I am aware that bosses, having both square and round parts, have been used for other and different purposes, and in some cases for purposes apparently similar; but I do not know of any instance in which the application of such bosses admits the removal of either separately, or both of the parts of a machine, when either or both are injured so that either or both may be immediately replaced by new parts; nor do I know of any instance in which the application of such parts is at once combined with a saving of expense, and an additional security for life and property, as is the case in the present instance; I therefore do not claim any of the parts herein described and shown, irrespective of the manner in which I have applied them to attain these objects.

But I do claim as of my own invention and desire to secure by letters patent of the United States, as new and useful in effect, the application of the boss *c*, with the wrought metal band 2, and square 1, acting with the bush *e*, to connect the windlass head B, with the shaft *b*, and at the same time support the heaving socket and flanch, in such a manner that either the head or the heaving socket and flanch, or both, can be immediately replaced when injured; the whole constructed and operating substantially as described and shown.

CHARLES PERLEY.

No. 6874.—*Improvement in Machinery for Splitting and Dressing Rattans.*

What I claim as my invention and desire to secure by letters patent, is the principle and combination of the vibrating cutter and guide, to use any number required to remove the whole surface of the cane or rattan, dividing the surface into any required number of strands.

SYLVANUS SAWYER.

No. 6875.—*Improvement in Leather Dressing Machines.*

Now what I claim as new and of my invention and desire to secure by letters patent, is—

First. The *adjustable* endless apron in combination with the scraper or extender, for the purpose and uses as herein described; and

Second. I claim the *adjustable* scraper or extender, as described, for the purposes and uses of leather dressing, as herein set forth.

CHARLES SLAWSON.

No. 6876.—*Improvement in Brick Presses.*

What I claim as my invention and desire to secure by letters patent, is—

First. The combination of the revolving conical duster (x,) with the rotating, moulding and pressing wheels (B, C,) constructed, arranged and operated in the manner and for the purpose herein set forth.

Second. I also claim the combination of the rotary toothed wheel (J,) with the moulding wheel B, for driving the pistons to the bottom of the moulds, after the bricks are discharged therefrom, constructed, arranged and operated in the manner and for the purpose herein described; said wheel being turned by the action of the moulding wheel in contact therewith, without the aid of any connecting cogged or band gearing.

Third. I also claim the manner of increasing the pressure on the clay whilst in the moulds, to form the brick, by diminishing the distance between the peripheries of the moulding and pressing wheels, by causing the pressing wheel to descend in the arc of a circle (13,) of a radius greater than the semi-diameter of the moulding wheel, the bearings or boxes of the axle of the pressing wheel, being secured to the parallel beams (i,) whose outer ends are made to rise in the arc of a circle concentric to the arc (13,) by means of vertical screws (h,) arranged to bear against the under sides of said beams to raise or lower the pressing wheel C, in order to increase or diminish the pressure on the bricks in the moulds, as aforesaid.

FERDINAND ZISEMANN.

No. 6877.—*Improvement in Chronometers for Longitude.*

What I claim as my invention and desire to secure by letters patent, is the dial with four hands, which are at right angles to each other, and revolve once in 24 hours; said dial being divided into hours and degrees, substantially in the manner and for the purposes above described.

JOHN SHELDON.

No. 6878.—*Improvement in Ox-yokes.*

But what I do claim and desire to secure by letters patent, is the pinion F, and rack bars G, G, working within the beam, in the manner and for the purpose set forth.

Second. I also claim the two iron plates N, N, as set forth.

I also claim the grooves L, and tongue K, in the manner and for the purpose set forth.

JOHN CHASE.

No. 6879.—*Improvement in Scythe Snaths.*

What I claim as my invention and desire to secure by letters patent, is curving forward that portion of the snath between the right hand nib or thole and the extremity to which the scythe is attached, in such manner as to form an obtuse angle between the scythe and snath at the point where they are joined, by which device the left hand and arm are extended forward, (previous to the scythe's entering the grass,) so that the labor of cutting is performed as much by drawing in the left arm as by forcing around the right, at the same time the position given the scythe allows it to cut the whole length, and is more easily sharpened at the heel with the rub stone than scythes hung on ordinary snaths.

LUTHER COLE.

No. 6880.—*Improved Auger for Boring Earth.*

We do not claim to be the original inventors of an auger for boring in the earth; but what we do claim as our invention and improvement and desire to secure by letters patent, is the peculiar construction of the auger, as aforesaid: namely, the combination of the spiral lip or shelf B, extending the whole, or nearly the whole length of the spiral twist A, with the said spiral twist A, which is made to approach the centre gradually till it intersects the shaft or stem C, forming an auger of a shape approximating to that of a frustum of a cone, and being entirely open at the lower end.

ASHLEY CRAFTS.
EBENEZER WEEKS.

No. 6881.—*Improvement in Distilling and Rectifying Spirits.*

I do not wish to confine myself to the special construction of the apparatus herein described, as this may be variously modified without changing the principle of my invention; but what I claim as my invention and desire to secure by letters patent of the United States, is the method of purifying and rectifying spirits, or giving any desired scent or flavor thereto, by causing the vapor of spirits to pass through a partial cooler containing the required substances for purifying, rectifying and impregnating it, substantially as described, whereby the vapor of spirits in passing through the said apparatus, under the combined action of partial cooling, is concentrated and purified, and separated from water, and the substances employed for imparting odors or flavors, as described, and this I claim irrespective of the kind of substance or substances, separately or connectedly, which may be used for producing the chemical effects on the spirit vapor.

CARL FALKMAN.

No. 6882.—*Improvement in Machines for Moulding Brick.*

What I claim as my invention and desire to secure by letters patent, is the combination of the slotted bar K, with the levers I, P, pin or bolt (*d*,) cranks J, N, secure to the horizontal transverse shafts H, M, connecting rods O O, attached to presser F, and cogged sector *b*, and rack G, on carriage for causing the presser to be raised in the moulding box simultaneously with the movement of the filled moulds from under the moulding box, substantially as herein set forth.

JOHN W. FROST.

No. 6883.—*Improvement in Ink Fountains.*

Having thus described my invention, what I claim as my invention and desire to secure by letters patent, is the mode of supplying the pen or marking instrument with ink, by the pen or marking instrument acting upon the valve or stopper of the ink fountain, to allow the ink to ooze out of the same when in the act of writing or marking, in the manner substantially as herein described.

ELIJAH JORDAN.

No. 6884.—*Improvement in Combined Table and Bedstead.*

What I claim as my invention and desire to secure by letters patent, is—

First. The table leaves A, A, No. 2, in combination with the folding side pieces B, B, B, B, for converting a dining table into a bedstead, as described.

Second. I claim the middle leaf C, of No. 1, with folding legs A, A, as seen in No. 3, in the manner and for the purposes described.

Third. I also claim the construction and use of the moveable towel frame D, of No. 2, in combination with the head board, as described.

Fourth. I also claim the construction of the apparatus for washing stand and ottoman or support on the table, as described.

FRANK LESLIE.

No. 6885.—*Improvement in Seed Drills.*

Having thus fully described my improvements, what I claim therein as new and for which I desire letters patent, is—

First. The combination of the plane pullies *b*, mouth pieces and slides *g*, operating as above set forth, for regulating the discharge of the grain.

Secondly. I claim the conical plates *p*, at the lower end of the tubes for distributing grain.

JACOB MUMMA.

No. 6886.—*Process for making Malleable Iron direct from the Ore.*

What I claim as my invention and desire to secure by letters patent, is the process of manufacturing iron directly from the ore, in a furnace composed of three combined chambers, one above another, all actuated by the same fire, whereof the upper chamber is used for heating and deoxidizing, the middle chamber for fluxing and working, and the lower chamber for reducing and finishing the iron, substantially in the manner and for the purposes herein set forth.

M. SMITH SALTER.

No. 6987.—*Improvement in Connecting Hubs with Axles.*

We do not claim confining hubs to axles by a spring catch on the one working in a groove in the other, this having already been done; but what we do claim as our invention and desire to secure by letters patent, is the fastening a wheel hub to its axle by means of an annular groove $(j,)$ near the extremity of the axle journal (B,) and a sliding retaining plate d, and a spring guard pin i, placed within the cap (C,) made fast to the outer end of the hub (A,) to wit: a curved portion of the said retaining plate d, being forced by the spring f, into the groove j, in the axle journal, and securely retained when in that position by the spring guard pin i, substantially in the manner herein set forth.

ELNATHAN SAMPSON.
A. M. BILLINGS.

No. 6888.—*Improvement in Hemp Brakes.*

What I claim as my own invention and desire to secure by letters patent, in the above described circular indented platform mill, with horizontal surface, is the circular indented platform, with the application of the bevel indented roller or rollers, on this horizontal circular indented platform, which gives a coarser and a finer brake to suit any thickness of stock, from the coarsest hemp to the finest and most delicate flax, and that it is capable of being extended to any diameter, to receive any number of rollers of any desired weight, and to do any amount of business by the application of any motive power, and the model is intended to show simply the form and position of the bars on the platform and the form and application of the rollers, viz: it is only intended to show the *principle* and not the mechanism or most convenient mode of application, as the mechanism and mode will vary in almost every instance.

AUGUSTINE SMITH.

No. 6889.—*Improvement in Sounding Boards for Piano Fortes.*

I am aware that two sounding boards have been framed together and confined to the frame work of a piano; I do not therefore claim to be the inventor of a double sounding board; but what I do claim as my invention and desire to secure by letters patent, is the combination of a sounding case with the ordinary sounding board of a piano (suitably perforated with sound openings,) substantially in the manner and for the purpose herein set forth.

RICHARD SWAN, Jr.

No. 6890.—*Improvement in Welt-cutting and Splitting Machines.*

I therefore claim the combination and arrangement of the two short cylinders I, K, the knife M, and chisel N, arranged at one end of an ordinary leather splitting machine, substantially in the manner and for the purpose of forming strips of leather, and cutting them into welts at one and the same time, and from larger pieces of leather, as specified.

JOHN E. TUCKER.

No. 6891.—*Improvements in Curvilinear Saw Mills.*

I do not wish to limit myself to the precise arrangement and construction of the various parts, as these may be varied without changing the principle of my invention; as for instance, only one rock shaft may be used for giving the vibratory motions to the saw guide, although I prefer the use of two, and instead of the chains and pulleys, connecting rods jointed to arms, may be substituted, but as these variations are familiar to the machinist, it is unnecessary to enumerate them.

What I claim as my invention and desire to secure by letters patent, is hanging the saw gate to slide in fender posts framed together, and sliding horizontally, to give the required lateral movements to the saw, substantially as described, when this is combined by rack and pinion, with a shaft and hand wheel, or the equivalent thereof, under the control of the attendant, substantially as described.

I also claim in combination with the above described method of hanging the saw gate, to give it the required lateral movements, connecting the pitman or pitmen with the saw gate, by means of a horizontal rod or rods on the saw gate, and governing the upper end of the pitman or pitmen, by a guide or guides, substantially as described.

I also claim the method substantially as herein described, of vibrating the saw by means of a rock shaft or shafts, connected therewith, and hung in the saw gate, in combination with the pulley or pulleys, or the equivalent thereof, through which the shaft or shafts slide, as described, the said pulley or pulleys, or the equivalent thereof, being combined with a crank handle, or its equivalent, on some stationary part of the framing, as described.

And finally, I claim in combination with the rock shaft or shafts, the vibrating saw guide connected therewith, substantially in the manner and for the purpose specified.

THOMAS DUGARD.

No. 6892.—*Improvements in Flood Gates for Fences.*

I do not claim the barrel, rollers, and pulley, as my invention when used separately; but what I do claim as my invention and desire to secure by letters patent, is the combination of all the parts with the frame work above described, so combined and applied as to produce the self-working flood gate as above described.

STEPHENS D. HOPKINS.

No. 6893.—*Improvement in Sofa Bedsteads.*

What I claim as my invention and desire to secure by letters patent, is the letting of the upholstered part of the back fall forward to meet and rest against the rear or back edge of the seat, to form the bed without moving the sofa from its face, or disturbing any part of the frame, as described.

JOHN A. ROBSON.

No. 6894.—*Combination of a Double Travelling Hearth with a Blast Furnace.*

Having thus fully described my improvement, what I claim therein as new and desire to secure by letters patent, is the combination of the double travelling hearth with a blast furnace, in the manner and for the purpose as herein set forth.

LORENZO SIBERT.

No. 6895.—*Improvement in Platform Scales.*

My invention or improvement, and that which I claim as new, is the combination of the pivot or bearing frame, or primary platform, the blocks of rubber or spring contrivances, and the superior platform with the weighing levers or mechanism, the whole being substantially in the manner and for the purpose as specified.

THADDEUS FAIRBANKS.

No. 6896.—*Improvement in Machines for Folding Paper.*

What I claim as my invention and desire to secure by letters patent, is folding sheets of paper, or other flexible substance, by machinery made and operated substantially upon the principle herein set forth; that is to say, by striking the paper or other substance, upwards in the line in which the fold is to be made, from a surface on which it has been extended, and seizing it between converging surfaces which complete the fold and deliver the folded paper; irrespective of the number or forms of the surfaces employed, and of the number or forms of folding edges required to give the requisite number of folds to the paper; irrespective also of the arrangements and devices for operating the several members of the machine.

EDWARD N. SMITH.

No. 6897.—*Improvement in Flour Bolts.*

What I claim as my invention and wish to secure by letters patent, is the arrangement of the bolting cloths upon a reel of any convenient construction, in such manner as to run the meal over the coarse cloth first, and the use of zinc or other metallic substance in and about the bolts to operate as a cooler upon the flour, after it is separated from the bran and shorts.

GEORGE W. BROWN.

No. 6898.—*Improvement in Butter Working Machines.*

What I claim as my invention and desire to secure by letters patent, is the use of two or more rollers, with adjustable scrapers, held in contact with the rollers by springs, or other devices, operating in a vat of running *water*, to wash butter and separate the broken capsules, cheesy matter, butter-milk, and other impurities, by dissolving those that are soluble in water, and washing away those that are not soluble, substantially as described; the water being let into the vat from a cistern placed above the level of the vat, and escaping at the spout T, on a level with the journals of the rollers.

ELIAS H. MERRYMAN.

No. 6899.—*Improvement in Brick Presses.*

We are aware that the mere employment of a ram or falling weight to produce density is not new; consequently we do not claim such—nor do we claim as our invention, the combination of the percussion ram and its piston, (whether connected to it or separated from it,) the brick mould and lower expulsion piston H, the whole being made to operate in such manner on clay in the mould as to compress said clay and afterwards expel it from the mould; but we do claim as auxiliary thereto and in combination therewith, machinery for holding the ram and its piston stationary, (just subsequent to its first blow,) and elevating the lower piston in the mould, in order to produce direct compression on the lower face of the brick, in manner and for the purpose as above stated; the machinery employed for such purpose being the forked slide bar U, its projection, the projection on the ram and the cams, which operate the slide bar and lower piston, as specified.

We wish it understood that we make no claim to a sliding mould charger, in connection with a mould and hopper, as constructed and made to operate prior to the date of our invention; but what we do claim as our improvement, is to so construct and use the sliding charger, in connection with the

ram piston, as above specified, as to render it (the said charger) a part of the mould during and for some time after the *first percussion* of the ram, the same being for the purpose of attaining certain advantages we have above maintained.

We further claim the weighted or spring scraper c', in its combination with the carriage C, and the mould plate E, and for the purpose of cleaning the top surface of the mould plate, as described.

We also claim, as a further improvement, to so construct the mould with the flaring or inclined sides, and combine them with mechanism for lifting the brick a short distance, just previous to the *second* percussion, as specified, as to not only enable the brick to be freed in a measure from its adhesiveness to the mould, but to permit the compressed air, or part of the same, in the immediate vicinity of the surface of the edges of the brick to escape, as explained, the diminution of adhesiveness tending to lessen the friction of the clay against the sides of the mould under the second percussion of the ram.

ARAD WOODWORTH, 3d.
SAMUEL MOWER.

No. 6900.—*Improvement in Processes for the Manufacture of Sugar.*

Having thus decribed the nature of my invention, and the manner in which the same is to be performed, I would remark, that I do not confine myself to the precise details, so long as the peculiar character of my invention be retained; but what I claim, is the combined use of sulphurous acid with lead in the manufacture and refining of sugar, substantially as herein set forth.

JOHN SCOFFERN.

No. 6901.—*Improvement in Railroad Trucks.*

Having thus described the nature of my invention, what I claim therein as new and desire to secure by letters patent, is the arrangement and combination of the journal boxes *(c,)* with the spring casing or pockets *(b, b,)* through which bolts are affixed to the frame, and acting as guides to the boxes, the whole being constructed and arranged in the manner and for the purpose substantially the same as herein specified.

JOHN F. ROGERS.

No. 6902.—*Improvements in Machinery for Dressing Flour.*

Having described the construction of our improved machine for separating the flour adhering to the bran, after the usual bolting operation has been performed in flouring mills, what we claim as our invention and desire to secure by letters patent, is—

First. The employment of a revolving hanging disc, of concentric rows of metallic polygonal beaters or cutters, and central hollow suspended shaft, made with curved induction and eduction branch tubes, said hollow shaft serving a double purpose of a hanging shaft and air conductor, for conveying streams of air to the space between the cylinders, in combination with a revolving disc turning in a contrary direction, also armed with concentric rows of metallic polygonal beaters and cutters, and radial wings arranged and operating in the manner and for the purpose herein fully set forth.

Second. We also claim the employment of the helical plate, in combination with the cylindrical bolt for producing the gradually enlarged space

into which the flour is received, and from which it is discharged, in the manner herein described.

We make no claim to the arrangement of the bolting cloth, and the other parts that are in other bran dusters in use.

CHARLES LEARNED.
STEPHEN HUGHES.

No. 6903.—*Improved form of Teeth in Harvesting Machines.*

What I claim as my invention and desire to secure by letters patent, is an *open triangular tooth or triangular hollow tooth* for cutting grass and grain, with its results, as herein described.

E. B. FORBUSH.

No. 6904.—*Improvement in Instruments for Milking Cows.*

Having now described the mode of making and operation of my invention, I will proceed to state what I claim and desire to secure by letters patent; what I claim therefore, is the sack A, made of any suitable material (gutta percha is preferable however) in combination with the elastic strap B, for compressing the teat, and neck of sack, and the exhauster tube E, and piston G, in form and manner, and for the purposes herein substantially set forth.

CYRUS KNAPP.

No. 6905.—*Improvement in Blank Account Books.*

What I claim as my invention, and desire to secure by letters patent, is connecting the leaves of a book with the cover, by means of a hinged strip attached to the back of the book and to the cover, so that they can be connected or disconnected by means of wires passing through the eyes or knuckles of the hinge strips, substantially as described, whereby the book can be disconnected from or connected with the cover, as described.

And I also claim making a book in sections, when the sections are provided with hinged strips, substantially as herein described, so that they can be connected with or disconnected from each other, and cover, substantially as described.

CHARLES HOPKINS.

No. 6906.—*Improvement in Rotary Pumps.*

What I claim as my invention, and desire to secure by letters patent, is the construction of each arm of the piston in such manner that while it is ordinarily kept in its proper position by the pressure of the water, its lower edge will yield to and pass over an obstruction which would otherwise break the pump.

PETER SWEENEY.

No. 6907.—*Improvement in Glazing Pottery Ware.*

What I claim as my invention, and desire to secure by letters patent, is the coloring of the glaze of pottery ware, by means substantially as herein set forth and described.

C. W. FENTON.

No. 6908.—*Improvement in Combined Plough and Seed Planter.*

Having thus described the nature of my invention, and pointed out the manner of using the same, and shown that by its peculiar construction and use in combination with a common single furrow plough, that one ploughing of the ground is saved, I hereby declare that I do not claim any of the individual parts of the plough and seeding apparatus; but what I do claim as my invention and desire to secure by letters patent, is the construction of the seed planter as described, consisting of a seeding apparatus combined with a single furrow plough, as described, so as to sow the grain at the first or second ploughing, in the manner and for the purpose herein fully set forth.

WILLIAM CROASDALE.

No. 6909.—*Improvement in Boring Machines.*

What I claim as my invention and desire to secure by letters patent, is the combination of three principles, namely; first, the manner in which the bed piece (to which the carriage is connected) is raised or lowered, as before described; second, the manner in which the bed piece may revolve to set the auger at any angle or degree; third, the manner in which the auger is withdrawn by the direct motion of the crank.

JAMES H. ALDRICH.

No. 6910.—*Improvement in Stop Cocks and Filters in Combination.*

What we claim as our invention and desire to secure by letters patent, is an improvement on the filtering cock, secured to us as aforesaid, is the arrangement of the water passages in the central pipe in combination with the filters having two chambers with a water passage leading from each chamber, and a recess, substantially as herein described, whereby filtered or unfiltered water can be drawn, and the filtering action reversed, as described.

ABRAM JOHNSON.
HENRY JOHNSON.

No. 6911.—*Improvements in Machinery for Twisting Shawl Fringe.*

Having thus described my invention, I shall state my claims as follows:—What I claim as my invention and desire to have secured to me by letters patent, is—

First. Dividing the yarns into proper quantities for the formation of the two strands, by means of the dividing plates and separator, shaped and made to slide up and down, substantially as herein above set forth.

Second. I claim twisting the *two* strands separately first, and then together by means of the twisting fingers or rubbers, constructed and arranged so as to turn inwards and outwards over each other, one above and the other below the yarns, substantially as herein above set forth.

Third. I claim the peculiar construction and arrangement of the separator, (as I have termed it) so that it may open over the rubbers, and drop down just before the two strands are to be twisted together, substantially as herein before described.

Fourth. I claim a machine for twisting the fringes of shawls, &c., having a stretching frame, dividing plates and separator, twisting fingers or rubbers, combined and operated successively as herein before specified and described.

MILTON D. WHIPPLE.

No. 6912.—*Improvement in machinery for dressing Barrel Heads.*

What I claim as my invention, and desire to secure by letters patent, is the application of the shield with the orifice and rest, attached to the same in combination with the plane K, to prepare the large bevel.

TIMOTHY SHEPARD.

No. 6913.—*Improved method of regulating the blow-off valve of Steam Boilers.*

What I claim as of my own invention and improvement, and desire to secure by letters patent, is regulating the "blow-off" water, by the action of the "feed" water, so that said "blow-off" water will always bear a certain proportion to the quantity fed, which ratio must vary according to circumstances and so as to cease entirely when the "feed" ceases to enter the boiler; secondly, I claim the combination of the "blow-off" valve with the check valve in such manner that the "blow-off" valve will be operated by the stem of the check valve, the whole being arranged and constructed substantially in the manner and for the purpose set forth herein.

CHAS. W. COPELAND.

No. 6914.—*Improvement in Propellers.*

What I claim as my invention and desire to secure by letters patent, is the propeller constructed of spiral curvilinear, tapering plates, formed and secured to the shaft as represented and described, and connected together at their outer extremities, and this I claim irrespective of the number of sets of these propellers, that may be placed on one shaft or of the number of shafts that may be used in propelling one vessel.

JOHN PATCH.

No. 6915.—*Method of ringing Fog-bells, and an adjustable clapper for the same.*

What I claim as my invention and desire to secure by letters patent, is indicating to vessels the position of channels, shoals or reefs, the depth of water, or state of the tide or currents at the entrance of harbors or elsewhere, by the varying ringing or tolling of a bell operated by adjustable machinery, substantially as herein set forth.

I also claim the combination of a shifting weight with the clapper, whereby its blows upon the bell in the several positions in which it strikes the same are equalized.

DANIEL JONES, Jr.

No. 6916.—*Improvement in Mills for Grinding Bark.*

Having thus described the construction and operation of our bark mill, what we claim therein as our invention and desire to secure by letters patent, is the vibratory motion given to the concave, substantially in the manner herein set forth.

SIDNEY A. BANTZ.
WILLIAM ANDREW.

No. 6917.—*Method of counter-balancing Window Sash.*

What I claim as my invention and desire to secure by letters patent, is the arrangement herein described of the hinged lever, pinion and racks, with respect to a couple of window sashes, whereby the sashes can be connected and disconnected, adjusted and counter-balanced, as herein set forth; but I make no claim to the mere counter-balancing of the sashes by this device.

WILLIAM T. BARNES.

No. 6918.—*Double Revolving Scraper.*

What we claim as our invention, and desire to secure by letters patent, is the double cavity or cyma reversa scoop and scraper, whether of the precise shape herein described, or of any other substantially the same revolving on pivots, so as to discharge and reload itself without being stopped and righted, (irrespective of the particular form of frame in which it is placed,) in combination with devices, substantially as described for fastening and setting free the same.

ASHLEY CRAFTS.
EBENEZER WEEKS.

No. 6919.—*Improvement in Stone Dressing Machines.*

I wish it distinctly understood that I lay no claim to the invention of one or more chisels, and one or more hammers, as arranged constructed, and applied to cutting or reducing stone, previous to the date of my invention or improvements; but that which I do claim is as follows, viz:—

I claim the rotary hammer as constructed and combined with each chisel stock, and made to impinge against it, and permit it to immediately afterwards move forwards preparatory to another blow, essentially as specified.

WILLIAM EAYRS.

No. 6920.—*Improvement in Grain Separators.*

What I claim and desire to secure by letters patent, is the combination of the raking apparatus with the notched surface, Fig. 3, under which the irons on the ends of the rakes pass, by which means the rakes are caused to shake, which motion of the rakes shakes the straw, and thereby separates the grain from it.

SAMUEL W. FOSTER.

No. 6921.—*Improved Frog for Railroads.*

What I claim as my invention and desire to secure by letters patent, is a railroad frog, constructed with hinged leaves, acted upon either by weights or springs, essentially in the manner and for the purposes herein described.

JNO. HOFFMAN.

No. 6922.—*Improvements in File Cutting machines.*

Therefore, what I claim as administrator of George Crosby, deceased, and desire to secure by letters patent, is—

First. The peculiar combination of the spring with the hammer, in the manner and for the purpose above set forth.

Secondly. The application of a check bar x x, for the purpose described.

CAMILLUS KIDDER,
Adminstrator of George Crosby.

No. 6923.—*Improvement in Cooking Ranges.*

First. I claim the arrangement of the flues m, n, o, and N, on the sides, front, back, and bottom of the boiler J, formed by the sides, front, back, and bottom of the boiler J, and the upright plates L, provided with valves at the top, and brick work of the range, in the manner and for the purposes herein set forth.

Second. I also claim the arrangement of the flues a, b', b, on the sides and back of the fire chamber, and the flues D, j, 5, under and at the back part and side of the oven and horizontal trunk E, with valves $(k,)$ and communicating with the apartments to be heated for heating the air admitted from the cellar or other place by the valves d, and z, to the proper degree to be conveyed to the apartments, as described.

Third. I likewise claim the arrangement of the plates H, projecting from

the plate l, and openings in said plate l, for dividing the heat and causing one portion to be carried around the front part of the wash boiler G, and the other portion around the back part of the same, as described.

NICHOLAS MASON.

No. 6924.—*Improvement in making Artificial Teeth.*

Having thus fully described my improved tooth, and its mode of manufacture, what I claim therein as new and for which I desire to secure letters patent, is an artificial tooth having a plate combined therewith, substantially in the manner and for the purposes set forth.

GEORGE E. MURRAY.

No. 6925.—*Improved Concealed Trigger for Fire-arms.*

What we claim as of our own invention and desire to secure by letters patent, is the construction of a concealed trigger capable of being disclosed and made ready to operate by simple pressure imparted by the hand to its rear end, as described herein.

JACOB PECARE.
JOSIAH M. SMITH.

No. 6926.—*Improvement in Mills for Grinding.*

What I claim as my invention and desire to secure by letters patent, is a grinding mill consisting of two rolls, on whose surfaces grooved and fluted helical ribs are formed, and which move with different velocities, the several parts of the machine being arranged and operated substantially as herein set forth.

SAMUEL W. POWELL.

No. 6927.—*Improvement in Pumps for Raising Water.*

What I claim is the annular ring, with radial arm and slot in cylinder, immediately between the exit and entrance, and giving motion to the annular ring or piston by an eccentric or cam, and the whole operating conjointly together, as particularly set forth and illustrated in my specification and drawings herewith.

ALEXANDER STIVEN.

No. 6928.—*Improvements in Machinery for Spinning Hemp.*

The improvements produced by the use of circular heads, which I claim as my improvement, instead of the mere transverse arms and all other modes heretofore used, are the great steadiness given to the revolutions of the flyer, and the greater velocity imparted to it—the circular heads operating as a fly wheel or regulator.

The other improvement I claim as mine, is the mode of retarding the velocity of the spindle in an expeditious and easy mode, and to the nicest degree. To effect this, I attach to the spindle rail "b," in a substantial manner, the spring "l," which is composed of steel, bent so as to rise from the rail and to receive in a tongued end, without touching it, the shaft of the spindle. Then at a convenient distance between the base of the spring and the spindle, I cause a fine thread iron screw to be fastened in the frame, passing up through the spring and having a thumb nut on the end. The operation of this is, that when the thumb nut is screwed down the tongues of the spring rest on the washer or friction plate hereafter described, and thus bind the foot of the spindle, around which is a rim or shoulder, as shown in the drawings, acting as a friction plate. Between the rim or shoulder and the spring, I use two washers on the spindle, the lower of leather and the upper of cast or wrought iron, turned and polished, and having in its upper surface two pins passing through corresponding holes in the tongues of the spring—an adjustable lever may sometimes be employed in place of the spring, to produce the dragging friction between the flanch or shoulder and the washer.

I do not claim as my invention the spinning frame, nor the spindle, nor bobbin, nor the use of a flyer, or the mode of operating same, but what I do claim as my invention or improvement, and desire to secure by letters patent, is the use of a circular headed flyer, having a circular head at each end, constructed and operating substantially as shown above.

I also claim in combination with a flanch or shoulder near the foot of the spindle, and permanently attached thereto the use of a moveable friction plate of metal, when the same is pressed to the flanch or shoulder or upon an interposed washer, by an adjustable spring or lever pressing on both sides of the spindle, and thereby producing a drag or retardation—while by its longitudinal action it retains the spindle steadily in its step, at the same time increasing the friction and retardation, whereby I am enabled to impart any required degree of tightness to the yarn as spun, and give it a greater uniformity of texture than can be done by any other known method as herein set forth.

My improvements were intended for the purpose of spinning rope yarn, from all sorts of hemp and flax, but are equally useful for spinning yarn for sail cloth from hemp or flax—also yarn for bagging from hemp, flax or cotton—also for spinning worsted yarns—in short, for strong yarns from any material, and are also well calculated for making rovings—also for making cotton twine from cotton yarn—and also for doubling and twisting all sorts of yarn and twines.

GARRET VAN RIPER.

No. 6929.—*Improvements in Condensers and Stuffing Boxes of Vapor Engines.*

I claim the ether generator or vaporizer and condenser, constructed substantially as described, whereby I obtain more perfect joints.

I also claim packing the stuffing boxes by means of leather or other analogous substance surrounding the body to be packed, when the said leather or other substance is surrounded by a chamber containing a fluid under pressure substantially as described.

PROSP. VERDAT DU TREMBLEY.

No. 6930.—*Improvement in Cast Iron Car Wheels.*

Having described and represented my railroad car wheel, by the foregoing drawings and specifications, what I claim as my invention and desire to secure by letters patent, is the particular manner of forming my wheel, it being formed of an inside and outside plate; each plate being formed of sunk and raised panels alternately, the space between the raised panels extending from the hub to the tread. The part of the plates which form the sunk panels join between the hub and the tread, for the purposes substantially as herein described and represented.

HIRAM H. WISER.

No. 6931.—*Improvement in Detachable Buckle Tongues.*

What I claim as new and desire to secure by letters patent, is the detachable buckle tongues, constructed and arranged in the manner and for the purpose herein represented.

ALVAH WORSTER.

No. 6932.—*Improvement in apparatus for Dyeing.*

What I claim as my invention is the above specified mode or process of producing either stripes or fancy patterns on or in cloth or fabrics of various kinds, the same consisting in the employment of one or more dye vats, and a dyeing frame, so constructed as to prevent the dyeing liquid from penetrating those portions of the cloth which we may not desire to color, and at the same time allow the coloring liquid to freely come in contact with the remainder or those which it may be desirable to color; all substantially as specified. And as auxiliary thereto I claim the employment of the vertical frames A, B, in connection with the main dye frame in manner and for the purpose of protecting from contact with dyeing liquid those parts of the cloth which may be strained directly over, against or on the ends of the horizontal strips of the main dye frame, as set forth. EDWARD BRIERLEY.

No. 6933.—*Improvement in Brick Presses.*

What we claim as our invention and desire to secure by letters patent, is the combination of the horizontal mould wheel B, with the mechanical discharger *k*, and endless conveyor *p*, in the manner and for the purpose herein set forth.

JOHN T. BROWN.
MOSES FULLER.

No. 6934.—*Improvement in apparatus for Bending Hames.*

What I claim as my invention, and desire to secure by letters patent, is the process of bending hames by means of the combination of the hook piece D, and the iron strap C, made fast at the ends in the manner and for the purpose herein fully set forth. ABEL GARDNER.

No. 6935.—*Improvement in machinery for turning Clothes Pins.*

What I claim as my invention is the rotary mandrel, the cutter for reducing the stick to a cylindrical shape, the cutter for forming the body of the pin, the cutter or cutters, for forming the head, the centre rod D, its fork and pattern lever; the whole being applied to carriages, and made to operate together, substantially in manner and for the purpose as above specified.

ASA GREENWOOD.

No. 6936.—*Double Bolt Trick Lock.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of the twin bolts E B, E′ B′, (any number being arranged in the same case) tumblers C, C′, having pins (*e*, *e*′,) at their ends, which enter corresponding notches in the bolts, traversing slotted plates D, D′, pins on the bolts E, E′, entering the slots of said plates D, D′, substantially as herein set forth; the bolts B, B′, nearest the key hole being required to be thrown out, and in before the other bolts E, E′, can be thrown out, and vice versa, as described. LEWIS M. HARTLEY.

No. 6937.—*Improvement in packing Pump Pistons.*

What I claim as my invention and desire to secure by letters patent, is the pump piston constructed essentially of two disks, and a valve substantially as herein set forth, whereby it is rendered capable of keeping itself packed with water. EDWIN A. JEFFERY.

No. 6938.—*Improvement in the mode of changing the gearing of Drawing Heads while in motion.*

What I claim as my invention, and desire to secure by letters patent, is a sliding spring key, arranged and operated substantially as herein set forth, for connecting any one of a series of wheels with a common spindle, and for disconnecting it therefrom at will.

ALFRED JENKS.

No. 6939.—*Improvement in Looms for weaving Figured Fabrics.*

Having thus described my improved loom, I shall state my claim as follows:—

What I claim as my invention and desire to have secured to me by letters patent, is the improvement herein above described in the machinery for operating the harness, so that any proper number of heddles may be used or changed as desired, without taking the loom to pieces; said improvement consisting first, in providing the moveable spring rests for supporting the jacks of the harness, when they are not in use, and which are sprung back by the bevel face on the shoulders of the jacks when they are kept in play by the cams on the pattern chain, the whole arrangement being substantially as herein above set forth; and second, in the "evener," constructed and operating as herein described for assisting in moving the upper heddle levers, and keeping them even, so that the cams or rollers on the pattern chain will operate accurately on the jacks as specified; meaning to claim the exclusive use of said spring rests and "evener," in a loom, the invention of which is entirely original with me.

I also claim the combination of rotating, lifting and depressing bars, arranged in endless chains, so as to revolve, as described, with the forked jacks, having internal shoulders, as specified.

MOSES MARSHALL.

No. 6940.—*Improvement in Bedstead Fastenings.*

What I claim as my improvement in the fastening, is the use of several projections *c*, as set forth, combined with the recesses *b*, cut into the sides of the mortise C, substantially in the menner and for the purposes herein set forth. JOHN MOULTON.

No. 6941.—*Improvements in Machinery for preparing Hubs for Boxes.*

Having thus fully described my invention, what I claim and desire to secure by letters patent, is—

First. I claim the hinged jaws B, B, B, constructed and arranged in the manner described and operated as set forth, for centreing the mandrel A, to bore wagon or carriage hubs.

Second. I claim the hinged segmental nut *p*, constructed as described, in combination with the mandrel A, which has a square and inclined thread *o*, cut upon it, as represented in figure 11, to coincide with a thread of the same form cut on the inside of the said nut, to prevent the mandrel from feeding down too fast in the act of boring, and also to allow the mandrel to be moved up or down at pleasure, in the manner substantially as herein described.

Third. I claim the mode of fastening the cutter *u*, to the mandrel A, by passing it through the slot or eye *t*, of the nut or cutter box C, formed with

an interior thread to fit on to the screw pin S, of the mandrel, whereby by screwing on the nut C, the end of the mandrel is made to retain the cutter *u*, firmly in its proper position for boring; in connection with this arrangement for setting and securing the cutting tool, I claim the cutter box, formed with the projection *v*, whereby by raising it (the box) until it comes in contact with the shoulders formed by the braces *h*, the cutter can be screwed and unscrewed without a wrench, as herein fully set forth.

ISAAC MUNDEN.

No. 6942.—*Improvement in Machinery for making Cord.*

What I claim in the foregoing as my invention and desire to secure by letters patent, is—

First. Revolving the bobbin frames on their own axes, to twist the strands, at the same time that they are carried round a common centre to twist the cord, by rolling them on the surface of a stationary annular inclined track, towards the inner or outer periphery of which they can be adjusted to run, so as to vary the relative twist of the strands and cord, substantially as herein set forth; but I make no claim to the mere turning of the bobbin frames by friction, by any of the devices usually employed for similar purposes.

Second. I claim the construction and arrangement of the central stem or spindle of the bobbin frame, operating substantially as herein set forth, whereby the yarns are collectively subjected to progressively increasing tension and twist, from the commencement to the end of the process of laying them into the strand, whereby the latter is rendered smooth and regular in its figure, and of uniform density and strength, and subjected to uniform tension while being lain into the cord.

WILLIAM E. NICHOLS.

No. 6943.—*Improvement in making Tin Boilers for Cooking Stoves with Cast Iron Bottoms.*

What I claim, is my improvement in the manufacture of boilers for cooking stoves, as above set forth, that is, making the bottoms of cast iron and the bodies of tin, the two being soldered together, substantially as described.

GIBSON NORTH.

No. 6944.—*Improvement in Bedstead Fastenings.*

Having thus fully described my improvements in bedstead fastening, what I claim therein as new and for which I desire to secure letters patent, is a bedstead fastening, consisting of a box formed of two parts, having screw threads therein, and divided through the centre longitudinally in the plane of the axis of said screws, as described and represented, said parts being so formed by locks as when inserted into a bed-post to have both parts firmly held in place against the force of the screw.

J. PARSONS OWEN.

No. 6945.—*Improvement in Faucet Breech Guns.*

What I claim as my invention and desire to secure by letters patent, is, in combination with a vibrating breech, turning within a chamber, the making of a groove or grooves in the inner periphery of the chamber, and extending out at the side or sides thereof, for the purpose and in the manner substantially as herein described. I also claim the revolving charge holder, located in the breech of the stock, substantially in the manner and for the purpose specified. And, finally, I claim the combination of the levers (*s* and *w*,) by means of which one charge only is permitted to fall forward at a time, when the muzzle of the gun is depressed, and by which it is forced home into the vibrating breech, as described.

A. D. PERRY.

No. 6946.—*Improved Apparatus for drawing Water from Wells.*

What I claim as my invention and desire to secure by letters patent, is the mounting of the respective parts of the drawing apparatus upon the rotating disk A, when the said disk is placed upon and supported by the circular platform B, which has the grooves *o*, *p*, formed in its face, and the notched ears *r*, *t*, rising from its periphery, that are combined and operate with the drawing apparatus, substantially in the manner and for the purpose as herein represented and described.

HARVEY W. SABIN.

No. 6947.—*Improvements in Self-acting Car Couplings.*

I lay no claim to the combination of a tumbler cylinder or roller, a catch hook, a coupling bar and box, as combined, constructed, and alleged to have been invented by A. G. Heckrotte, of Washington, D. C., the same being described in a paper termed the "Scientific American," published at New York or Washington on the twenty-ninth day of January, eighteen hundred and forty-eight; nor do I claim the combination of a hook box and coupling link, as described in the application for a patent, which Daniel R. Pratt, of Worcester, has lately made to the commissioner of patents at Washington, and as lately patented by him in England; but what I do claim as my invention, is the revolving series of arms E F G H, and the link C, constructed with an opening O, or cross bar N, at one end or each of its ends, in combination with the box A, and pawl L, all substantially as above specified.

ALBERT G. SAFFORD.

No. 6948.—*Improvement in Machinery for Jointing Staves.*

Having thus explained my invention, I claim the plane stock of the jointer formed with a depression in the middle, for the purpose of guiding the shaving plane E, to shave the exact taper on the stave, from the bilge on the middle to the end of the stave, in the manner herein described, in combination with the mode of producing a traverse taper or feather of any angle on the edge of the stave, according to the diameter of the cask or barrels, by the stave being held to the action of the shaving knife E, by the combination of the plane stock C, and the clamp with the guide rail F F, in the manner herein represented and described.

DAVID VAUGHAN.

No. 6949.—*Improved Machine for Grinding or Polishing Tools.*

What I claim as my invention is the following, to wit:—

First. That part of the above described machinery by which an axe or other implement to be polished receives a reciprocating motion, and by which that motion is regulated, in combination with that part of the machinery by which it is made to cant or rotate at the same time, sufficiently to present all parts of the surface to be polished, to the polishing wheel.

Second. The machinery above described for holding and giving motion to the axe or other implement, while being polished, in combination with the polishing wheel, moved and kept in motion in the manner described in the above specification. JOSEPH VAUGHAN, Jr.

No. 6950.—*Improvements in operating the Hammers of Spike Machines.*

What I claim as my invention and desire to secure by letters patent, is —

First. The combination of advancing and receding hammers, with their respective adjustable wipers and hinged brays, arranged and operating substantially as herein set forth.

Second. I claim the adjustable wipers (*k*,) which can be set to cause the hammers to form spike points more or less sharp.

Third. I claim drawing the pointing hammers of a spike or nail machine along the rod, substantially in the manner herein set forth, during the operation of forming the point. HARRY A. WILLS.

No. 6951.—*Improvement in Bending Wood.*

I do not claim as my invention the mechanical powers by which the operation of bending timber is effected, nor any particular form of machinery to carry my new method into operation; but the machine herein described is a form which I have adopted to carry out and combine my new method of bending timber; but what I do claim is my method of bending fibrous materials by means of the upsetting movements, or the upsetting and relaxing movements combined, as exemplified in the screw H, whether such movement or movements be produced by means of the screw, wedge, cam, lever, rack and pinions, or any other equivalent means.

THOS. BLANCHARD.

No. 6952.—*Improvement in Bran Dusters.*

What I do claim as my invention and desire to secure by letters patent, is—

Constructing the rotary scourer and separator with concentric roughened and reticulated prismatic rings, and hanging roughened or toothed prismatic rings, the latter being placed in the spaces between the former, so as to leave concentric spaces between their inclined surfaces for the passage of the bran and flour over and around the ridges and sides of the aforesaid several prismatic rings; in the manner and for the purpose herein fully set forth, by which the flour adhering to the bran, after leaving the ordinary bolts, is completely separated therefrom and saved, to be mixed with the superfine flour, or for any other purpose which the miller may desire, the flour passing through the wire bolting screens G and I, and out of the curb or case through the spout S, whilst the bran is forced to the upper part of the curb, and out of the spout R, by the centrifugal action of the separator, aided by the blast of wind created by the rapid rotary motion of the said scourer and separator, as herein fully set forth; I make no other claim. ROBT. M. DEMPSEY.

No. 6953. —*Improvement in the Manufacture of Buttons.*

Having thus described my invention, I claim the new and useful improvement in the manufacture of buttons, of substituting a wooden mould for the common metallic shell that is stuffed with paper, and using the said wooden mould either for the top or bottom of the button, and covering the button entirely or only part of it with some textile fabric or substance, and securing the shank and the covering inside between the wooden mould and ring or collet of the button, in the manner herein represented and described.

PETER KIRKHAM.

No. 6954.—*Improvement in Clover Harvesters.*

What I claim in the foregoing as my invention and desire to secure by letters patent, is maintaining the series of teeth at nearly the same angle with the ground at all heights to which they may be adjusted therefrom, in the manner herein set forth and represented in fig. 1.

I also claim forming the fingers with a depression on their upper side above the knife, substantially in the manner and for the purpose herein set forth.

SAM'L KRAUSER.

No. 6955.—*Improved Alarm for Indicating want of Water in Boilers.*

Having thus explained my invention, I claim the introduction of the tube or box on the flue or other surface exposed to extra heat when water is too low, filled with water or other suitable liquid, for the purposes set forth.

AZEL S. LYMAN.

No. 6956.—*Combined Lap and Butt-welded Tube.*

Having thus fully described my improvements in wrought iron pipes, I wish it to be understood that I do not claim either a butt-welded or lap-welded joint therein, as they are both old devices; but what I do claim, is a pipe composed of a combination of the butt-weld with lap-welded ends, as bove particularly set forth. JAMES McCARTY.

No. 6957.—*Improvements in Folding Gates.*

I do not claim any of the individual parts composing my gate, nor do I claim placing thin pieces of timber or other materials parallel to each other, inclining to a horizontal plane, and crossing these with other similar parallel pieces inclining in an opposite direction, and uniting them at their intersections by loose pins forming diamond and half diamond spaces between them, and opening and closing on the principle of the "*lazy tongs;*" but what I do claim as my invention and desire to secure by letters patent, is a single or double gate, constructed substantially as herein above described, so as to fold up horizontally in opening the same by degrees, according to the width of opening required, without the necessity of moving the whole structure, as when it swings on hinges horizontally in the arc of a circle, or vertically on a horizontal bolt or pin when folding in the manner of a parallel ruler, my said improved gate moving horizontally over rails on wheels, with great ease whilst being contracted or expanded in opening or closing the gate, as herein fully set forth. ISAAC MERITT.

No. 6958.—*Improvement in the Manufacture of Flax and Hemp.*

Having thus described my invention, what I claim as new and useful, and for which I desire to secure letters patent, is the following process for preparing hemp and flax for spinning, viz: the treating of the lap after it comes from the "spreading frame," with an alkaline solution to soften the gluten of the flax, and washing it afterwards, as has been described, as a preparatory process for drawing it in the common drawing frame, and drawing the flax lap in the commom drawing frame, while the said flax lap is in a wet state, to

draw out, separate the finer from the coarser fibres, and reducing the flax to its greatest possible fineness, making less tow and running the machinery at a greater speed than by the dry process, and dispensing with the hetchell gill frame, substantially as herein set forth. ROBERT PATTERSON.

No. 6959.—*Improvement in Signal Lanterns.*

What I claim as my invention, and desire to secure by letters patent, is subdividing the front of the lantern into three divisions or sectors, and arranging and operating the colored glasses enclosed therein, in the manner herein described. HUGH SANGSTER.

No. 6960.—*Improved Method of Revolving the Hammer of Repeating Fire-arms.*

What I claim as my invention and desire to secure by letters patent, is the combination of the cocking and spring levers with the double ratchet wheel on the revolving hammer, substantially in the manner herein set forth.
CHRISTIAN SHARPS.

No. 6961.—*Improvement in Churn Dashers.*

I do not claim the tub, hollow shaft, hollow arm, or any part of the churn that has heretofore been used for making butter; but what I do claim as my invention and desire to secure by letters patent, is—

The combination of the perforated *spiral float* B, with the *prismatic horizontal radial arm* C, and vertical shaft A, arranged and operating in the manner and for the purpose herein set forth. HENRY STANTON.

No. 6962.—*Improved Valve-motion, Cut-off and Steam Stops for Rotary Engines.*

Having thus described the principle or characteristics of my inventions, which distinguish them from all other things before known and described, and represented the manner of constructing and using the same, and some of the modifications of which it is susceptible, what I claim as my invention and desire to secure by letters patent, is—

First. The method of operating the steam stops or abutments by a crank motion derived from the rotation of the piston wheel, substantially as described, when this is combined with the rotating piston wheel, the form of the periphery of which, is such as would be generated by its rotation and the motions of the steam stops, substantially as described, that the steam stops may always in their motions be in contact with the periphery of the piston wheel, and not operated by such periphery as described.

Secondly. I claim making the ends of the steam stops with projections or toes that embrace the sides of the piston wheel, and extend within the periphery thereof, substantially as described, when this is combined with the grooves or recesses in the packing ring, or any equivalent substitute therefor, substantially as described, whereby the steam is prevented from passing from one side to the other of the pistons through the grooves or recesses in which the ends of the stops slide, as described.

And thirdly, I also claim in combination with the herein described method of operating the steam stops, the employment of cut-off valves operated by eccentrics (or their equivalents) on the crank arbors that operate the steam stops, substantially as described. HENRY G. THOMPSON.

No. 6963.—*Improvement in Bottle Fasteners.*

What I claim as my invention and desire to secure by letters patent, is the combination of the metallic caps with the tube *b*, constructed and used in the manner and for the purpose set forth. ISAAC WINSLOW.

No. 6964.—*Improved Concealed Hammer and Turning Nipple Lock.*

I do not lay any special claim to the peculiarity of construction of the individual parts of this lock, as they may be varied in many ways, nor do I claim a concealed lock for exploding the cap inside the stock; but what I do particularly claim as my invention and desire to have secured to me by letters patent, is the combination of the lever K, with the nipple attached thereto, and sliding hammer M, arranged and operated substantially as set forth, by which the nipple is turned and exposed to receive the percussion cap, and the hammer cocked simultaneously by the movement of the lever, the cap being exploded within a chamber inside the stock in a peculiar manner, as set forth in the foregoing specification, by which the inconvenience arising from flying fragments of the exploded cap and from smoke at the moment of discharge are avoided. ANDREW WURFFLEIN.

No. 6965.—*Improvement in Machinery for Dressing Staves.*

What I claim as my invention and desire to secure by letters patent, is the tilting plate *d*, placed in front of the forward cutter *a*, in the head K, in combination with the pin *r*, projecting from the beam T, of the supporting frame, for the purpose of throwing the shavings clear of the cutters, substantially in the manner herein set forth. ASA BROAD.

No. 6966.—*Improved Lock for Fire-arms.*

What I claim as new and of my own invention and desire to secure by letters patent of the United States, is the mode described of forming the seer 3, as a lateral spring, with a bevel on the part next the tumbler, and the mode of forming the projection 6, on the tumbler 8, with a similar bevel, so that these two parts operate together to discharge the fire-arm, by the direct pull of the trigger, and place the parts in a situation to effect a second, or successive discharges by the reverse motion of the trigger, the whole of these movements and effects, being produced by the seer and tumbler, without any intervening parts, substantially in the manner described and shown.
ORISON BLUNT.

No. 6967.—*Improvement in Drawing Boards.*

What I claim as my invention, and desire to secure by letters patent, is the combination of the pointed right angled plates C, bars (*a*,) moving over the pins (*b*,) forming the legs on which the board rests, spiral springs D, and rod or bale E, of the form of an ellipsis for clamping and unclamping the paper, as before described. HENRY W. CHAMBERLIN.

No. 6968.—*Improvement in Flutes.*

What I claim as my invention and improvement, and desire to secure by letters patent, is—

First. Removing the third and sixth holes from their ordinary place on the old flute to a point farther down, and sounding the notes produced by the said holes, by keys operated at the natural fingering place, thereby producing with

ease a quality of tone, now unattainable, or attained only by great skill, and then with uncertainty.

Secondly. I claim producing the true sharp and flat keys by means of the double holes and operating keys, as described herein.

C. G. CHRISTMAN.

No. 6969.—*Improved Process for Making Thin Iron Castings.*

What we claim as our invention, and desire to secure by letters patent, is the process of making thin or light castings of iron, by pouring the metal into a mould of iron that surrounds the article to be cast, entirely, with the exception of the gates; said mould being previously smoked on the inside and provided with a case or knapsack which contains a non-conducting material, the whole process being conducted substantially in the manner and for the purposes herein set forth.

HENRY BLEECKER.
WILLIAM E. BLEECKER.
SAMUEL D. VOSE.

No. 6970.—*Improved Earth Borer and Elevator.*

Having thus fully described the nature and operation of my machine for boring the earth and raising to the surface in a cylinder by one operation, whatever is displaced by the process of boring; what I claim as new therein, and desire to secure by letters patent, is the combination of the auger and the circular plate I, fixed upon the same shaft with the cylinder C, which does not revolve with the shaft, and may be moved along it, by which I dispense with the force necessary to turn the cylinder and empty out the excavated material, in an easier manner than has heretofore been practised.

PHINEHAS DOW.

No. 6971.—*Improvement in Cast Iron Car Wheels.*

Having thus fully described my improvement in forming and constructing a solid cast iron wheel, I do not claim as new or as my invention, corrugated plates or flanges, or corrugated spokes; but what I do claim as my invention and discovery is the form of the car wheel, made with the multiplied and reversed or alternate corrugations of the plate or flanges, as above specified and described, and also the combination of the said plates or flanges with the said spokes, so corrugated or bent, as above set forth and described, so as altogether to prevent straining or cracking of the metal by contraction in cooling, and giving thereby and by the said combination, greater strength and durability to the cast iron car wheel, than has before been obtained.

CARMI HART.

No. 6972.—*Improvement in Bedsteads.*

Having thus fully described and represented my improved bedstead, I do not intend to limit myself to the fastening the frame thereof by rods, as described and represented, as this may be effected by right and left screw threads being cut on the tenons of the side rails and other known devices; but what I do claim as my invention and desire to secure by letters patent, is the union of the side and end rails of a bedstead into a frame entirely independent of the posts, substantially in the manner and for the purpose as herein set forth.

BENJAMIN HINKLEY.

No. 6973.—*Improvements in Breech Loading Fire Arms.*

What I claim as my invention, and desire to secure by letters patent, is in combination with a magazine for containing the cartridges or loaded balls, and which communicates with the barrel, the employment of a sliding charger, operated substantially as herein described, for the purpose of forcing the cartridges as they are required, towards the rear end of the magazine as described.

Second. I claim making the charger in two parts connected by a spring, and working substantially as herein described, whereby any difficulty arising from irregular working or yielding of the parts will be avoided, and by which also the transfer of the cartridges or charges to the carrier is insured.

Third. I claim combining the carrier, the breech pin, and the abutting or stop lever with the sliding trigger bar, substantially as herein described, whereby all the movements of all these parts are effected by the motions of the trigger bar, as described.

Fourth. I claim the longitudinal fillet on the trigger bar in combination with the pinion, having one cog grooved for the passage of the said fillet, substantially as described, by means of which the pinion is made to retain the sliding breech pin in place, while the trigger bar completes its motion to discharge the piece and to elevate the stop or abutting lever, as described.

Fifth. I claim the stop which prevents the passage of the cartridges from the magazine, when this is combined with the carrier and magazine, substantially as described.

Sixth. I claim in combination with the receiving chamber and carrier, the lever which hugs and steadies the cartridge or ball therein, substantially as described.

Seventh. I claim in combination with the carrier that elevates and transfers the cartridges or charges, the spring catch, by means of which the carrier can be held down to permit the piece to be re-cocked without transferring a charge to the barrel, substantially as described.

And finally, I claim the spur on the spindle of the cock in combination with the catch on the sliding breech pin, substantially as described, by means of which the pull on the cock has the effect to withdraw the breech pin from the breech of the barrel, as described.

L. JENNINGS.

No. 6974.—*Tubular packing for Pistons and Stuffing Boxes.*

And having now described the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim as of my invention is the employment of yielding hollow rings, and yielding tubing (of whatever material the same may be composed) filled with air or gas, more or less compressed, for the better packing of the pistons and stuffing boxes of engines worked by steam, air, or gas, as before exemplified and described.

WILLIAM CROFTON MOAT.

No. 6975.—*Improvement in Railroad Trucks.*

Having thus fully described my improvement, what I claim therein as new and for which I desire to secure letters patent, is the combination of the friction wheels and truck wheels, with the truck frame, substantially as herein described, in which I employ sliding boxes, and connect the parts with springs, while at the same time the axles are made to work steadily in union, and produce the desired effect in a perfect manner.

J. W. MOYER.

No. 6976.—*Improvement in Seed Planters.*

I do not claim to be the first inventor of an intermediate cog wheel, hanging rod, connecting rod, crank, rock shaft, lifting rods, or any of the mechanical devices separately considered, as these are all common articles of mechanism; but what I do claim as my invention and desire to secure by letters patent, is the peculiar construction of the short axles Y, as described, in combination with the drilling and seeding machine, said machine containing an intermediate cog wheel for gearing and ungearing the seed roller with the cart or driving wheels; said machine also containing a device for simultaneously elevating and dropping all the tubular drills, and likewise containing separate lifting and suspending hook rods, for raising or suspending one or all of the tubular drills at the same time. JACOB PEIRSON.

No. 6977.—*Improvements in Wheels for Carriages.*

I do not claim to be the original and first inventor of an iron rimmed wheel, composed of cast iron segments or felloes bound together by a wrought iron band, having wood spokes and hub, nor any part of the wheel heretofore used in a similar manner to that herein described in the construction of carriage wheels; but what I do claim as my invention and desire to have secured to me by letters patent, is the manner of employing the screw bolts between the ends of the cast iron felloes of the peculiar construction herein set forth, in combination with said felloes, and the ordinary circular wrought iron tire in the formation of carriage wheels for common roads. ISAAC B. WARD.

No. 6978.—*Improvement in Portable Lanterns.*

What I claim as my invention, is the lantern constructed with a closed flame chamber, (having glass or transparent sides,) in combination with an open air supplying and chimney tube G, (extending down through the top of the lantern,) and the cap plate or disc, the whole either with or without upper frustum H, and as applied together and made to operate substantially as above specified.

I make no claim to the use of a reflector in a lantern, as it is ordinarily used, but what I do claim is the combination of the reflector, the lamp, the closed flame chamber, and the chimney over the flame, (the same being as above specified and as represented in the drawings,) in order that the external downward or supplying current of air shall so encircle the upward current of smoke and hot air proceeding from the flame, as to prevent it in a great measure from smoking or soiling the reflector, and thereby cause it to improperly distribute the light which eminates from the flame.

NATHANIEL WATERMAN.

No. 6979.—*Improvements in Machinery for Boring Window Blinds.*

What I claim as my invention and desire to secure by letters patent, is the combination of the graduating frame J, spring stops or pawls (n,) bent levers (m,) attached to the rib p, by chains or cords with the sliding frame H, to which the frame or slat to be bored or mortised is secured as described.

I also claim the combination of the traversing arms y, projecting from the slides moving in the plates O, and provided with clamp screws for securing the ends of the frames, with the hollow traversing boxes K, M, provided with clamp screws, and springs and spring rollers u, for steadying the frame in its passage, as herein set forth.

I likewise claim the combination of the elliptical cams (b, e,) secured to the upright shafts E, (d,) having cog wheels on their upper ends, with the pulleys (a,) in the manner and for the purpose herein set forth.

JOHN WILEY.

No. 6980.—*Improvement in Apparatus and Process of Rotting Hemp and other Fibrous Materials.*

In conclusion, I do not confine myself to the particular apparatus, nor the form or arrangement thereof, as herein described; but that which I do claim as my invention and desire to secure by letters patent, is the treating of hemp, flax, China grass, and other vegetable fibrous substances, in preparing them for spinning into fine yarns by steam, alkaline and saponaceous solutions, and drying the same by steam, as herein before described, without handling the same during the process, thereby saving much labor and expense, as well as avoiding loss of material from tangling, matting, &c.

Secondly, I claim the combination of the vessels A′, B, and A, with their connecting pipes arranged so as to operate upon the hemp, &c., with the steam and solution, in the manner described herein, or such other arrangements as shall include substantially the same process.

LEMUEL W. WRIGHT.

No. 5992.—*Improvement in Grain Drills.*

What I claim as my invention and desire to secure by letters patent, is the combination of the fixed and sliding apertures a and c, with the stops b, as herein described, to form passages which are constantly open, and through which the seed may be discharged from the hopper into the drills made by the teeth, without being clipped, bruised, or otherwise injured by the operation. ALBERT G. BARTLETT.

PATENTS EXTENDED DURING THE YEAR 1849.

Casting Chilled Rollers and other Metallic Cylinders and Cones.

What I claim as my own invention, and not before or previously known in the above described machine or improvement, is that the tube or tubes or passages called gates, through which the metal is to be conveyed into the mould, shall not enter the mould perpendicularly at the bottom, but slanting, or in a direction approaching to a tangent of the cylinder, or if the gates enter the mould horizontally, or nearly so, that they shall not enter in the direction of the axis of the cylinder, but in a tangent form, or inclining towards a tangent of the cylinder. JAMES HARLEY.

Improvements in Fire Arms.

What I claim as my invention, and desire to secure by letters patent, is:

First. Combining a rotating chambered breech with the lock, in manner substantially as herein described, so that, by the operation of lifting the hammer to cock the lock, the said breech shall be rotated to the extent required to bring a loaded chamber in the line of a barrel preparatory to the discharge, substantially as described.

Second. Combining the rotating breech with the lock by means of a key

catch, lever, or the equivalent thereof, substantially as specified, so that, by the act of lifting the hammer to cock the piece, the said breech shall be liberated to admit of its being rotated and then relocked, that it may be held in the proper position during the discharge, substantially as described.

Third. Placing the nipples of the rotating breech in recesses made in the rotating breech, or between partitions, substantially as described, as a protection to the caps, or touch-holes, from the effects of lateral fire, as described.

Fourth. Connecting the barrel with the recoil shield at the back of the rotating chambered breech by means of an arber, or spindle, (on which the breech rotates,) and a wedge-key, substantially as described. And

Fifth. Connecting the barrel with the recoil shield by means of the lock plate below the rotating breech, substantially as described, in combination with arber or spindle connection, as described, whereby the parts are held together firmly, whilst at the same time they admit of a quick and easy disconnection.

SAMUEL COLT.

Improvements in the Screw Wrench.

What I claim as my invention and desire to secure by letters patent, is the arrangement of the screw upon the two circular edges of the main bar, in the manner and for the purpose herein described; also, the combining the nut and slide jaw in the manner and for the purpose herein described.

SOLYMAN MERRICK.

Machine for bending or setting Felloes for the wheels of Carriages or Wagons.

What I claim as my invention and for what I ask a patent, is the machine or apparatus as herein described, and may properly be denominated revolving cylinders, to be used for the bending of felloes for carriages and wagons of all descriptions, sleigh runners, iron tires for wheels, coopers' sett hoops, vessels' mast hoops, &c.; in which machine two cylinders are employed, operating together by means of certain accessary parts, in the manner or upon the principles herein set forth; not intended, however, to limit myself in the formation of the accessary parts, or to the specific use herein stated, but to vary these in any way and to apply them to any use not varying from the principle, as I may find convenient, whilst the machine continues substantially the same, and a similar effect is produced by analogous means.

EDWARD REYNOLDS.

Improvement in the construction of Stoves for the burning of Anthracite Coal and other Fuel.

What I claim as my invention, and desire to secure by letters patent, is the forming of the exterior or shell of furnaces or fire places, for stoves of various kinds, the bodies of gas retorts and other apparatus, which are to be exposed to great alterations of temperature, by the combination of separate rings, rims, or frames of metal, usually of cast iron, by which means any difference of expansion in the respective parts may take place without the danger of breaking, whilst any portion which is defective may be easily removed and its place supplied.

JORDAN L. MOTT.

Improvement in the Art of and Apparatus for the Transportation of Goods on Canals and Railroads.

JOHN ELGAR. [See Re-issue, No. 154.]

Improvement in Machine for making Horse Shoes.

I shall now proceed to claim what I consider new and invented by me; and—First. I claim the machine for rolling, drawing, or shaping horse shoes, as described and represented by the two sheets of drawings, Nos. 1 and 2, *as a whole as there arranged;* namely, those parts called side steels or irons *l*, *l*, which confine the piece of iron intended for a horse shoe on the sides, while it is rolled or shaped by the vertical swedges E, E. I also claim the vibrating or reciprocating motion of moving frame *f*, *f*, which gives motion to all the other parts of the machine, which enables the operator to feed up the iron intended for horse shoes to the stop A, cutting it off accurately, and rolling or shaping them at the same time.

And I wish it expressly understood, that I claim the above named reciprocating motion, whether it be by side steels and swedges, as above named, or whether it be merely a pair of common grooved rollers, the one having a groove or channel turned or cut the shape of the shoe, the other having a tongue so shaped as to fit the groove exactly, the periphery of said tongue being so shaped as to roll the shoe thinner at some part than others, as may be desired. It will be observed, that if two rollers, as above named, were connected together at the end by two pinions, and on the other end of one were fastened a wheel, similar to the wheel M, on one of the shafts *g*, of the bending machine, as seen at sheet No. 3, figure 1, having a rack operating into said wheel, connected to a crank, in every respect similar to the bending machine, it is evident that said rollers would move backward and forward, making such part of a revolution as the length of the crank might give them. I therefore claim said reciprocating motion, when applied to rolling or shaping horse shoes by rollers. I do not claim the use of *solid rollers*, in rolling horse shoes, for I believe this has been done, or rather *attempted to be done*, which has universally proved a failure, in consequence of not having reciprocating motion to enable the operator to feed up the iron to a stop, so as to ensure the piece of iron intended for a horse shoe being always in the proper place, to . . . . . the impression from the rollers.

Another reason why rolling horse shoes by solid rollers has failed, is that the tongue of the one and socket of the other are liable to wear, consequently have to be laid aside, whereas my method of having the tongue or swedges, as also the socket divided into sections which allows the whole being ground, repaired and moved at pleasure, by screws so as to ensure the sides of the socket fitting close to the tongue, as also having one side of the socket moveable, to allow the shoes being discharged. I also claim the method of having those parts of the machine which confine the iron on the sides, represented as side steels, marked *l l*, moveable, so as to permit their being ground (when worn) at the same time moving them close up to the swedges E E, by screws. I also claim the plan of making the rollers *i i*, sheet No. 1, Fig. 2, with an open mortise, so as to prevent the swedges D D, being moved: in fine, I claim the method of dividing the working parts, which roll or shape the shoe into such section as enables me to grind, replace or move them at pleasure, in lieu of solid rollers which when worn have to be laid aside altogether. I wish it particularly understood that I do not confine myself to the precise method of operating the machine for rolling or shaping horse shoes, as represented by the drawings hereunto annexed, as in lieu of the frame *f f*, being moved it may be made stationary, and the rollers *i i*, moved backwards and forwards in slides, with corresponding movements given to the other parts, which would produce analogous results.

Secondly. I claim the machine for grooving and punching horse shoes, as represented by the drawings and description thereof. That is to say, I claim the manner for confining the piece of iron intended for a horse shoe, between the side steels *l l*, while in the act of grooving and punching by the upper swedge D, having the pieces of steel fastened under the caps *i i*. I also claim the vibrating or reciprocating motion of the machine in grooving and punching, for the same reasons as set forth in my claim to the machine for rolling or shaping.

I wish it understood, I do not claim the rolling a plain groove or channel along the one edge or side of a bar of iron intended for horse shoes, for I believe this has been done, but I do claim the manner of so shaping the edge of the steels as to leave projection for the head of the nails, as in all cases, even when made by hand, the groove is first made, then the holes, but in my plan I make both at once, which serves the double purpose of adding strength to the punches, by being formed on and composing part of the steel which forms the groove or channel, as also performing both operations at once. I also claim, the method of fastening the two pieces of steel which grooves and punches the shoe under the caps *i i*, which permits their being screwed down by the four screws, when necessary in consequence of their becoming short by filing or other causes. And as I deem the discovery of forming the projections or punches on the same piece of steel, which grooves or channels the shoes of great importance, I shall describe the manner in which it is done. I take a piece of cast or other steel, previously rolled or hammered to at about one fourth of an inch in thickness, about four inches wide, and as long as necessary to form the groove on one side of the shoe. I then grind or reduce the edge by a file to the proper shape to form the groove, then mark off where I want the projections or punches, filing down the spaces between the projection so as to give them sufficient length to form the holes, which adds great strength to the punches compared with the method of inserting small pieces of steel into a roller to form punches, as has been proposed, although I believe never carried into effect, from its impracticability.

Thirdly. I claim the machine for bending horse shoes, as represented and described by the drawings thereof, in every *particular as there arranged.* And in addition to which, I claim any other method of bending horse shoes, so long as the piece is taken hold of by one end, while the other is bent round the mould; no matter whether the mould revolve round or is stationary, and the piece of iron is pulled or bent round it.

I also claim in a particular manner the placing the face of the mould downwards so as to permit the shoe to drop or discharge itself; I wish it also expressly understood, that I claim the using a piece of flat iron, as represented by the dotted lines (see sheet No. 3, Fig. 3,) for the purpose of keeping the shoe close up to the mould, while in the act of bending. I also claim, the *nipper* or *button* N, (see sheet No. 3, Fig. 3,) which closes and holds fast the end of the horse shoe by striking against the piece L, while in the act of bending round the shoe shape K, and which opens in consequence of its coming in contact with the other side of the piece L, and lets the shoe drop.

I also claim, the manner of making the gearing or wheels connected with the pieces of iron K & L, eccentric or so shaped as to have the pitched line describe the same circle as the shoe, otherwise *the shoe* would not bend regular.

It will be observed that although the gearing is by no means round, nevertheless it operates accurately while they revolve round on their respective shafts.

HENRY BURDEN.

PATENTS RE-ISSUED DURING THE YEAR 1849.

No. 128.—*Improvement in Bee Hives.*

Having thus fully described the nature, construction and operation of my invention, what I claim as new and desire to secure by letters patent, is providing a harbor or place of refuge for the bee-moth or miller, which admits of her free ingress and egress thereto, to secrete herself, and lay her eggs undisturbed by the bees, the entrance to the trap not being of sufficient size to admit the passage of the bee.

I also claim as original, the combination of the moth trap or harbor (K,) before described, with the suspended hive (A,) constructed and arranged in the manner set forth.

A. SANBURN.

No. 129.—*Improvement in Propelling Ships.*

What I claim as my invention, and desire to secure by letters patent, is the above described location or arrangement of the propeller shaft in combination with the rudder, made with a slot or recess to admit of the play thereof, substantially in the manner and for the purpose specified.

I also claim sustaining the propeller abaft the rudder, by a swinging or sliding frame, substantially as described, in combination with the shaft made in two parts, substantially in the manner and for the purpose specified.

And finally, I claim in combination with the arrangement or location of the propeller shaft, and the hanging of the propeller in a sliding or moving frame, the marking of the shaft in two parts, substantially in the manner and for the purpose specified.

J. ERICSSON.

No. 130.—*Improvement in the Saw Mill for Re-sawing Boards and other Timber.*

What I claim as my invention, and desire to secure by letters patent, is the method of presenting, gauging or guiding the board by means of the rest and pressure rollers, or their equivalents, substantially as herein described, in combination with the saw, substantially as described; and I also claim the method substantially as herein described, of hanging and straining the saw by the combination of three stirrups at the ends of the saw, constructed and connected in manner substantially as herein described.

PEARSON CROSBY.

No. 131.—*Machine for Sewing Cloth of all kinds with a running Stitch.*

What I claim as my invention, is the combination of a straight or curved needle, and two or more gear wheels for forming the doubles or corrugations of the cloth, the whole being made to operate together essentially as above specified; and in combination therewith I claim one or more cogged wheels

D D F, applied substantially as above specified, and for the purpose of advancing the doubles of the cloth along the needles, as above explained.

I also claim the herein before described mode of preventing either retrogradation or any improper movement of the needle, viz: by making it with a crook or bend, and placing against said bend, one, two or more wheels D E F, as herein before described, and as represented in the drawings.

BENJAMIN W. BEAN.

No. 132.—*Improvements in Barrel Machinery.*

What I claim as my invention and desire to secure by letters patent, is—

First. The combination of the slide rest *k*, guided in the manner set forth, with the tool L, for turning off the cask, constructed and arranged in the manner set forth.

Second. I also claim the apparatus for chamfering and howelling and crozing, that is to say, the combination of the cylinder E, open at both ends, so that both ends of the cask can be worked off without changing, with the ring chucks O, for fastening the cask into the cylinder, and with the tools, as herein described, for chamfering and howelling.

Third. I also claim the crozing tool V, with the changeable face plate *w*, as herein set forth.

Fourth. I likewise claim the combination of the stock *l*, cutter l^1, adjustable and gauge plate l^2, constituting the tool for turning and smoothing the outside of the cask, as above described and represented in figure 4.

Fifth. I likewise claim the peculiar construction of the tool for howelling the cask, as above described and represented at fig. 9.

Sixth. I likewise claim the peculiar construction of the tool for chamfering the ends of the cask, as above described and represented in figure 8.

Seventh. I likewise claim the mode of edging and jointing *bilge* staves for making barrels and other *bilge work*, by the employment of a swing frame, having a *concave or convex* bed in or against which the stave is sprung and secured to the required bilge, in combination with the revolving edging saw and reciprocating straight jointer, or either, whether the said swing frame for confining the stave in its bent position, and conveying it to the edging saw and straight jointer, be constructed, arranged and operated in the manner herein set forth, or in any other mode or manner that may be substantially the same, and by which analogous results shall be produced.

WM. TRAPP, JR.

No. 133.—*Improvement in Preparing Wool and Cotton for Carding.*

What I claim as my invention and desire to secure by letters patent, is the application of heat and moisture to wool, by means of steam, for the purpose of rendering its fibres sufficiently soft, flexible and pliable to pass through the operations of carding and spinning, without requiring the use of oil upon the same.

I also claim the application of steam to cotton, or other soft fibred substance for the purpose of giving additional softness and flexibility to their fibres during the operations of carding and spinning.

GEO. L. MASON.

No. 134.—*Improvement in Machinery for making Felt Fabrics, &c.*

What I claim as my invention and desire to secure by letters patent, is first, the combination of the fan, oblong box, or spout and cylinder, for the purpose and in the manner herein described; and second, the combination of the two aprons, operating for the purposes and in the manner herein described, and also these in combination with the combined fan, spout and cylinder, as herein described.

HEZEKIAH S. MILLER.

No. 135.—*Improvement in Floating Dry Docks.*

What I claim as my invention and desire to secure by letters patent, is:—

First. The end floats T, T, by means of which the dock may be balanced and leveled, and which may be forced down by machinery, substantially as herein described.

Second. I claim regulating the line of motion of said floats, and of applying the control exerted by them to the dock, by means of guides and frames in which they are made to move, the whole operating and constituted substantially as herein described.

JOHN THOMAS.

No. 136.—*Improvement in Hot Air Registers.*

Having thus briefly described the construction and operation of my register, I will briefly state what I believe to be new about it, and what are some of the improvements made.

I do not claim the wheel itself as new, or a thing by any means patentable; but what I do claim and desire to secure by letters patent, is the application of the upright or vertical wheel, or part or segment of a wheel, to the opening and closing of hot-air registers and ventilators, the edge or periphery of which is placed flush, or nearly so, with the top surface of the register, and can be acted upon by the foot if desired. The wheel, or part of a wheel so placed, imparting motion to the valves through a connecting rod or rods, which are connected or attached to the wheel at a point distant from its axis, and to the valves, by pins at a distance from their centres of motion; the connecting rod or rods moving in a circular direction with and corresponding to the motion of the valves that are moved.

CHARLES F. TUTTLE.

No. 137.—*Improvement in Atmospheric Churn Dashers.*

What I claim as my invention and desire to secure by letters patent, is the employment of open mouthed buckets or beaters, having (a cavity or) cavities formed in their front or beating surfaces, in a vessel partially filled with milk or cream, for the purpose of enabling the buckets or beaters as they are operated to pass through air and cream, (or milk,) and thereby to force quantities of air into the cream (or milk) and to lift portions of the cream (or milk) into the atmosphere in the upper portion of the churn, by means of the said cavities in the beaters, for the purpose herein set forth.

NATHAN CHAPIN.

No. 138.—*Improvement in Cooking Stoves.*

We do not wish to limit ourselves in the construction of stoves to the use together of the two improvements herein above specified, as either may be used separately, as for instance, the advantages derived from the depressed flues may be obtained without the manner of connecting the two fire places, and in like manner all the advantages of the manner herein above described, of combining and connecting the two fire places, may be obtained without the depressed flues; but when both improvements are employed in connection, the best results will be obtained. Nor do we wish to limit ourselves to the employment of our depressed flues for carrying the draught around the oven, in the manner described, as the depressions in the bottom flue may be used in connection with other arrangements of flues, whether for carrying the draught in the direction described, or in any other.

What we claim therefore as our invention, and desire to secure by letters patent, is making the depressions in the bottom flue below the oven, substantially as described, for the purpose of equalizing the heat in the oven, as described.

And we also claim as our invention the combination of the two fire places by means of a flue pipe connecting the one with the ash pit of the other, and passing through the diving flue to divide the draught, substantially as described, and thus insure the passage of the heated products of the combustion from either or both around the oven when desired, as described.

ELIAS JOHNSON.
DAVID B. COX.

No. 139.—*Improvement in Screw Wrenches.*

What I claim as my invention and desire to secure by letters patent, is moving the sliding jaw by a screw, combined with and placed by the side of and parallel with the bar of the permanent jaw and handle, substantially as described, when the required rotation for sliding the jaw is given by the head or roset, (or its equivalent,) which retains the same position relatively to the handle during the operation, substantially as described.

And I also claim moving the sliding jaw by a screw, combined with and placed by the side of and parallel with the bar of the permanent jaw and handle, substantially as described, in combination with the roset, or its equivalent, retained in its position relatively to the hand, in the manner described.

LORING COES.

No. 140.—*Improvement in the Machine for cleaning Wool from Burrs and other foreign matter, and also for Ginning Cotton.*

Having thus fully described the nature and operation of my machine for cleaning wool, cotton and other fibrous substances, I proceed to state what I claim as my inventions and improvements. I claim—

First. The machine as a whole, consisting in general of the constituent parts, in combination, as above described, and that though equivalents may be substituted for some of those parts for like purposes, and substantially the same, viz: the combination of the common feeding and picking apparatus with the comb toothed cylinder.

Secondly. I claim forming and arranging the teeth of cylinders for burring wool and cleaning cotton and other fibrous substances, in such a manner that their outer convex sides shall be substantially concentric with the axis of the cylinder, for the purpose of seizing and holding the fibres, and presenting a surface against which the guard can act in removing burrs and other foreign matter therefrom.

MILTON D. WHIPPLE.

No. 141.—*Improvement in the manufacture of Indian Rubber Goods by means of Zinc Compounds.*

We here disclaim the use of rubber and sulphur alone, as also the submitting of rubber or rubber compounds to a high degree of heat; neither do we wish to secure the right of coloring rubber, such having frequently been done by rubber manufacturers.

But what we do claim as our invention and desire to secure by letters patent, is India rubber fabrics made by the combination of caoutchouc, in its several varieties, with zinc compounds, in their several forms, as herein set forth, and sulphur; and in combination with these, the submitting our compound to the action of a high degree of heat; the whole being combined and manufactured substantially as above described.

H. G. TYER.
JOHN HELM.

No. 142.—*Machine for Breaking Coal.*

What I claim therefore as my invention and desire to secure by letters patent, is the arrangement of the teeth on the two rollers, substantially as herein described, so that in their rotation the teeth of one shall come opposite the spaces between the teeth of the other, with sufficient space between to hold lumps of the required size, the rollers being so combined by gearing as to make them rotate in opposite directions, and with the required velocities, to retain the relative position of the teeth of the two rollers, as described.

JOSEPH BATTIN.

No. 143.—*Improvements in Looms for weaving Carpets and other figured Fabrics.*

Having thus fully described the manner in which I construct and arrange the respective parts of my loom for weaving carpets, and shown the manner in which the same operates, what I claim as new and desire to secure by letters patent, is—

First. In connection with the power loom, depressing one trap board, (or more,) whilst the other (or corresponding trap board or boards) is elevated, substantially as described.

Second. I claim placing and working the journals above the trap boards, substantially in the manner and for the purpose specified.

Third. I claim working the card prism of the jacquard by a cam, (or the equivalent thereof,) connected with the loom or deriving motion therefrom, and whilst the trap boards are at rest, substantially as described.

Fourth. I claim regulating the delivery or giving out of the warps, by the tension of the warps or chain, acting on a vibrating roller, (or the equivalent

thereof,) in combination with a regular and positive take-up motion, for taking up the woven cloth, substantially as described.

Fifth. I claim the employment of a series of shuttle boxes and a receiving shuttle box, on each side of the loom, and supported in a separate and independent frame by the side of the loom, substantially as described.

And, lastly, I claim stopping the loom, when a change of colors is required, by combining the shipper (or the equivalent thereof) with the jacquard, substantially as described.

E. B. BIGELOW.

No. 144.—*Improvement in Brussels Looms.*

Having thus declared the nature or character of my invention, specified the construction and operation thereof, and pointed out the various modes in which I have contemplated the application of the several principles, what I claim as my invention and desire to secure by letters patent, is—

First. Giving to the two parts of the mechanism that which weaves the cloth or forms the body of the fabric, and the one which operates the figuring wires, a separate and distinct organization, substantially as described, when these are connected and confined by an intermediate mechanism, which shifts the motive or driving power from one to the other, substantially as described.

And in combination with this, I claim also the employment of the two brakes to arrest the momentum of the moving parts, to prevent any conflict in the operations of the two parts of the mechanism.

Second. I claim, in combination with a loom for weaving such looped fabrics as herein designated, the employment of a box, trough, or the equivalent thereof, for receiving and holding the figuring wires preparatory to their being introduced under the figuring warps, substantially as described.

Third. I claim the fingers, or their equivalents, which receive the figuring wires from under the pile or figuring loops, in combination with the trough, box or the equivalent thereof, into which they are deposited preparatory to the introduction of them under the figuring warps, substantially as described.

Fourth. I claim in combination with the mechanism which withdraws the figuring wires from under the pile or figuring loops, the fingers or their equivalent for transferring the said wires to the trough, or the equivalent thereof, from which or by which they are transferred to the open shed of the figuring warps, substantially as herein described.

Fifth. I claim the method substantially as herein described, of introducing and dropping the figuring wires in the open shed of the figuring warps, as described.

And finally, I claim the method substantially as herein described, of supporting the figuring wires in the open shed of the figuring warps when they are being introduced, as described.

E. B. BIGELOW.

No. 145.—*Improvement in Power Looms.*

What I claim as my invention and desire to secure by letters patent, is—

First. Combining with the lay of a power loom, and on each side thereof, two cams and two rollers, or their equivalents, one of said cams for working the lay, and the other for holding it in a stationary position during the throw of the shuttle, substantially in the manner and for the purpose specified.

Second. The employment of two series of shifting shuttle boxes, on one or both sides of the lay, hung and operated in separate and independent frames on each side of the lay of the loom, the said boxes being shifted and otherwise operated by machinery receiving motion from the loom, or from some first or other mover, working in unison with the power loom, substantially as herein described, and for the purpose specified.

Third. Combining with the shipper for stopping the loom when the shuttle fails to pass through, or the equivalent thereof, a protector for each series of shifting shuttle boxes, hung in separate frames independent of the lay, substantially as described, and for the purpose specified.

And lastly, in combination with the lay of the loom, and shuttle boxes hung in separate frames, independent of the lay, the employment of jointed guides, substantially as described, for guiding the shuttles in their passage from the shuttle boxes to the lay, and vice versa, and which yield to prevent breaking when the shuttle fails to pass entirely through, substantially as described.

E. B. BIGELOW.

No. 146.—*Improvements in Power Looms for weaving Plaids, &c.*

First. What I claim as my invention and desire to secure by letters patent, is regulating the delivery of the unwoven warps, as required for the weaving of the cloth by the tension of the said warps, substantially as described, in combination with a brake or stop motion, substantially as described, to prevent the tension given to the warps by the beat of the lay from affecting the delivery motion, as set forth.

Second. I also claim in combination with the method of regulating the delivery of the warps by their tension, and controlled by a brake, the taking up of the woven cloth by a regular and positive motion, substantially as described, that the figures produced thereon may be regular and well matched, the irregularities of the weft threads being by this means taken up in the thickness, instead of the length of the cloth.

Third. I also claim in combination with the roller, of a positive and regular take-up motion of a weaving loom, the measuring wheel and hand or pointer, operated substantially as described, whereby the quantity of cloth woven is at all times indicated as described.

Fourth. I also claim communicating the shifting motion for shifting the shuttle boxes up and down when a change of color is required in the weft, by the gravitating force of a weight or the equivalent thereof, substantially as described, whereby all injury to the mechanism is avoided, should anything be interposed to arrest the motions of the moving parts, as described.

Fifth. I also claim arresting the motion of the shuttle, and relieving the picker from the end thereof, preparatory to the shifting of the shuttle boxes, by combining with the lay and picker, a spring lever, one arm of which moves in a slot or the equivalent thereof, to give it the required motion, substantially as described.

Sixth. And lastly, I claim stopping the loom and arresting the momentum of the moving parts at a given and determined point, by means of a lever which when the weft thread is not carried through, is brought into contact with a spur on the crank shaft, or the equivalent thereof, which forces it back to shift the belt when this is combined with the fingers which enter recesses in the lay, and which, when the weft thread is carried through, are pushed forward, to prevent the lever from stopping the loom, as described.

E. B. BIGELOW.

No. 147.—*Improvements in Looms for weaving Brussels Carpets, &c.*

Having fully described my improvements, what I claim as new and desire to secure by letters patent, is guiding and supporting the pile wires, as they pass between the warps, by means of a guide or guides, through, or on which the said wires slide, as above specified, or in any other way substantially the same.

E. B. BIGELOW.

No. 148.—*Improvement in Winnowing Machines.*

Having thus fully described the nature, construction and operation of my invention, what I claim therein as new and desire to secure by letters patent, is forming the feeder with slats, one below the other in its bottom and openings between them, the whole being made in this or any equivalent way for the purpose described.

I also claim the separating riddle, the shelf (*t*,) for regathering and refeeding the grain and cheat, for the purpose described.

I also claim giving the separating riddle (*h*,) and screen (*i*,) a rear vertical motion, in the manner and for the purpose described, whether the motion be given to each separately or conjointly.

JOHN THUSTON.

No. 149.—*Improvement in Seed Planters.*

We wish it to be understood that we do not claim the separate or individual action of the seed tubes, independently of the seed rollers and hoppers; but what we do claim as our invention and desire to secure by letters patent, is—

First. The simultaneous throwing into and out of operation, by the movement of a lever or other mechanical equivalent or device, each seeding cylinder and its respective drill or seed tube, for the purpose of sowing with any number of hoppers and drills, that may be required in sowing point or other irregular shaped land, without stopping the animal or animals attached to the machine: not intending to limit ourselves to the particular construction herein described and represented in the annexed drawings, but to vary these in any way that we may deem proper, so that the before described results are effected by means substantially the same as those described in the foregoing specification.

Second. We also claim the arrangement of the spur wheels, for the purpose of connecting the seed rollers Y, and hoppers P, to the shaft O, as before described, in such manner that they can be disengaged or engaged at pleasure, whilst the machine is in motion.

MOSES PENNOCK.
SAMUEL PENNOCK.

No. 150.—*Improvement in Looms for weaving Brussels Carpeting, &c.*

Having fully described my improvements in the foregoing specification, what I claim as new, and desire to secure by letters patent, is—

First. Giving to the lathe of the power loom a counter motion to vary the extent of its approach towards the face of the cloth at any required beat; to properly lay the filling, to form the pile of the cloth or clear the shed as above specified.

Secondly. Moving the trough or grooved bar, which is employed to carry the pile wires under the warps (or the equivalent thereof,) forward towards the face of the cloth, to clear the shed as above described, or in any other way which shall accomplish the same end by substantially the same means.

E. B. BIGELOW.

No. 151.—*Mill for Rolling Irregular Shapes by means of a Cam Pattern.*

Having thus fully described my improved apparatus for rolling metal to an irregular thickness by pattern, I wish it to be understood that I do not claim moving the top roller up and down by a pattern, that having already been done, but what I do claim as my invention and desire to secure by letters patent, is the employment of cams, as herein described, for elevating or depressing one of the rollers of a rolling mill, in combination with gearing the same as above set forth, so that a pattern of any length on the cam, may be made to effect the surface of any given length of bar, in proportional ratio, by change of the relative size of the gearing, by which I avoid in rolling long bars, any long patterns, difficult to handle and expensive to construct.

JOHN S. HALL.

No. 152.—*Improvement in Fire Proof Safes.*

Having thus described our improved concrete safe, what we claim therein as new, and desire to secure by letters patent, is joining the interior and exterior cases by the door frame, and connecting both cases with the insulating cement, by means of the anchors embedded therein, substantially as herein set forth.

We likewise claim the employment (in chests so joined,) of hydraulic cement as the insulating substance for fire proof safes or chests, it being stronger when concreted than other cements heretofore used for the purpose, thus making a safe of superior strength and durability, especially when the same is constructed in the manner herein described.

EDWARD HALL.
JOSEPH L. HALL.

No. 153.—*Improvement in Harvesting Machines.*

I do not claim to be the inventor of the turning alternating rake and slotted double platform; but what I do claim as my invention and desire to secure by letters patent, is alternating the rake and elevating and depressing its teeth, by devices made, arranged and operated substantially as herein described.

I do not claim to be the inventor of a tight case for the back of the blade to run in, nor of the slotted teeth to protect its edge; but what I do claim, is making a toothed blade case, in uniform sections (*c*, Fig. 2,) each section having a tooth cast in one piece with it, the whole being attached to the rack bar (*a*, Fig. 2,) by screws or otherwise, in such manner that if the tooth or of any section should get broken, it may be readily replaced by an extra one, cast from the same pattern, and kept on hand for that purpose; the rack thus made being equally efficient as a solid case, to protect the stock from dirt and obstructions and can be more easily and cheaply repaired.

I also claim the manner in which the position of the point of draught is changed by means of the slides (b^4 and c^4, Figs. 3 and 4,) and clamo screws (D' and *c*, Fig. 3,) as herein set forth

FRANCIS S. PEASE.

No. 154.—*Method of attaching Sectional Boats to each other by means of a Rule joint.*

What I claim as my invention in the foregoing, is the connecting of canal boats by rule joints for the purpose of adapting them to the curvature of the canal, and of steering them by their action upon each other, upon the same principle with that by which a rudder is made to steer an ordinary boat. I do not claim the invention of portable section boats herein before described.

JOHN ELGAR.

No. 155.—*Improved Cushion for Billiard Tables.*

What I claim as my invention, and desire to secure by letters patent, is constructing a billiard or bagatelle table cushion, consisting of an air tight elastic tube formed upon and to be used in combination with a solid but flexible and elastic core, which core shall remain within the tube and be permanently a part of the cushion, such cushion to be used inflated with air, whenever extraordinary elasticity is required, or on the other hand, capable of being used as a solid elastic cushion, whenever through accident or choice the tube part is permitted to loose the air by which it was inflated.

I also claim the application of air or gas in a tube or tubes of India rubber or other elastic material, to form the cushion of a billiard or bagatelle table, as described. I also claim the mode of extending the tube or cushion in one length around the table, in consequence of which the tubes or cushions may be inflated at the same time with one air pump, whereby all parts are equally inflated, and are of equal elasticity.

ABM. BASSFORD.

No. 156.—*Improvement in processes for the manufacture of India Rubber.*

What I claim as my invention and desire to secure by letters patent, is the curing of caoutchouc or India rubber, by subjecting it to the action of a high degree of artificial heat, substantially as herein described, and for the purpose specified.

And I also claim the preparing and curing the compound of India rubber, sulphur and a carbonate or other salt or oxide of lead by subjecting the same to the action of artificial heat, substantially as herein described.

CHARLES GOODYEAR.

No. 157.—*Improvement in Felting India Rubber with Cotton Fibre.*

What I claim as new and of my invention, is incorporating the fibres of cotton or other substance with India rubber, by pressing the fibres of a fleece or bat of cotton or other fibrous substance into a sheet of India rubber in the green state, without subjecting the fibres, after they have been incorporated, to a stretching or drawing operation, substantially as herein described.

CHARLES GOODYEAR.

ADDITIONAL IMPROVEMENTS

No. 88.—*Improved Right or Left Hand Lock.*

What we claim as our invention and desire to secure by additional letters patent, is the constructing the lock tumbler of two parts C, C, of such a form and combined with each other and with the arms *b*, *b*, of the lock bolt, in such a manner in relation to the key holes F, F, placed in reversed positions near each end of the lock, that a key will operate the tumbler and bolt equally well when inserted into either of the said key holes, substantially in the manner herein set forth.

L. R. LIVINGSTON.
J. J. ROGGEN.
CALVIN ADAMS.

No. 89.—*Improved Lever Scale for Canals, Railroads, &c.*

Having thus fully described our additional improvement, what we claim as new therein and desire to secure by letters patent, is two or more angular or bell crank levers, in combination with a reversed angular lever, to be connected together by rods, substantially as herein described, and placed on each side of the top or base of a lock, dock, canal, or other desired place, said levers to be connected to a graduated beam, and by the multiplication of which levers, a scale may be formed strong enough for any purpose, and weighing with entire accuracy, dispensing with the right or horizontal levers, as described in our letters patent for improved lever scale, which letters patent are dated February 6th, 1849.

ELY ELLICOTT.
SAMUEL A. ABBOTT.

No. 90. — *Improvement in Machines for Thrashing and Cleaning Grain.*

Having thus fully described my improvements, what I claim and desire to secure by this addition to my letters patent, is—first, the modification of the shoe, by the employment of the cover *(x,)* as herein specified, to the upper spout, and forming an offset and opening at *(y,)* together with the spout (N',) as above described.

I also claim the concave, made adjustable and reversable in the manner and for the purposes set forth in the above specification.

B. G. H. HATHAWAY.

No. 91.—*Improvement in Seed Planters.*

Having thus described my improvements, what I claim therein as new and desire to secure by letters patent, is hinging the teeth to the frame or beam, and bracing them by flexible struts, which possess sufficient rigidity to resist all ordinary strains to which the teeth are subjected, without flexing, but which suddenly yield and allow the teeth to turn back when they meet with an obstruction which would otherwise break or stop the machine, as described and represented.

J. D. WILLOUGHBY.

No. 92.—*Improvement in Harness Saddles.*

What I claim as my improvement, and desire to secure by letters patent, is a flexible pad rigidly connected with the saddle tree, substantially in the manner herein set forth.

JOSEPH W. BRIGGS.

DESIGNS

No. 209.—*Design for Stoves.*

Having thus described my new design, I shall state my claim as follows: What I claim as my invention or production, and desire to have secured to me by letters patent, is the combination of ornamental mouldings and carvings or configurations herein above described and represented in the drawings, for the side and back plates of a cooking stove.

N. P. PECK.

No. 210.—*Design for Stoves.*

What I claim and desire to secure by letters patent, is the production of a new set of stove patterns, herein described in the accompanying drawings.

HENRY C. FAY.

No. 211.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the drawings, making an ornamental design for a cooking stove.

SAMUEL W. GIBBS.

No. 212.—*Design for Carpets.*

Having thus fully described my design for carpets and other similar fabrics, I desire to secure the same by letters patent, a full illustration being given in the drawing accompanying.

PETER LAWSON.

No. 213.—*Design for Carpets.*

Having thus fully described my design, and illustrated the same by the accompanying drawing, I claim and desire to secure the same by letters patent.

PETER LAWSON.

No. 214.—*Design for Carpets.*

What I desire to secure by letters patent, is the above described design, for weaving into carpets and other similar fabrics, as fully set forth in the accompanying drawing.

PETER LAWSON.

No. 215.—*Design for Furniture Ornaments.*

What I claim as my invention and desire to secure by letters patent, is the above described design, called Major Heyward, as fully set forth in the drawing hereunto annexed, and the use thereof, as a furniture ornament, in whatever manner the same may be applied.

ISAAC F. BAKER.

No. 216.—*Design for Furniture Ornaments.*

What I claim as my invention and desire to secure by letters patent, is the above described design, called *Cora Munro*, as fully set forth in the drawing hereunto annexed, and the use thereof for ornamenting furniture, in whatever manner or in whatever combination the same may be applied for that purpose.

ISAAC F. BAKER.

No. 217.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the new and useful design for cooking stoves, (which I call "the Republic,") as appears from the foregoing specification and the drawings attached thereto.

GEORGE E. WARING.

No. 218.—*Design for Stoves.*

Having thus distinctly represented and described the nature and arrangement of the respective ornaments and figures upon the side plates of my cooking stove,—

What I claim as new and desire to secure by letters patent, is the configuration and arrangement of said ornaments, as herein designated and represented.

CHARLES J. WOOLSON.

No. 219.—*Design for Stoves.*

I do not claim the back plate and its ornaments, but what I do claim as my invention and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the annexed accompanying drawing, making an ornamental design for a coal stove.

ABRAM HANEY.

No. 220.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of ornamental forms and figures, represented in the accompanying drawings, forming an ornamental design for a cooking stove.

S. H. RANSOM.

No. 221.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the design of an air-tight wood parlor stove, as shown and described in the specification and drawings, figures B, C, D, E.

ABRAM HANEY.

No. 222.—*Design for Stoves.*

What I claim as my invention and design to secure by letters patent, is the ornamental design of stove plates for a cooking stove, as represented in the accompanying drawing.

SAMUEL W. GIBBS.

No. 223.—*Design for Stoves.*

Your petitioner claims to be the original inventor or producer of the design and ornamental part of said stove.

CHARLES W. WARNICK.

No. 224.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the drawings, the same forming an ornamental design for an elevated oven.

S. H. RANSOM.

No. 225.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms, represented in the annexed drawings, making an ornamental design for an air tight parlor stove.
S. H. RANSOM.

No. 226.—*Design for Stoves.*

My claim is limited to the design, as represented in the foregoing specification.
S. W. GIBBS.

No. 227.—*Design for Cooking Stoves.*

Having thus described my new design, I shall state my claim as follows:

What I claim as my invention or production and desire to have secured to me by letters patent, is the combination of mouldings, panels, or ornamental carvings or configurations, herein above described and represented in the drawings for the several doors and other parts of the front and bottom plates, of the "Bay State coal cook stove."
A. C. BARSTOW.

No. 228.—*Design for Stoves.*

Your petitioners claim to be the original inventors or producers of the design and ornamental part of said stove.
WILLIAM B. CLINE
S. HILL.

No. 229.—*Design for Stoves.*

What we claim as new and our invention, and desire to secure by letters patent, is the above described and represented ornamental design for coal and wood parlor stoves.
JOSEPH G. LAMB.
CONRAD HARRIS.

No. 230.—*Design for Stoves.*

What I claim as new and desire to secure by letters patent, is the design and configuration of an ornamental parlor stove, as set forth.
WM. L. SANDERSON.

No. 231.—*Design for a Portable Grate.*

Having thus described my improved design for the front of a portable grate I shall state my claim as follows:

What I claim as my invention or production, and desire to have secured to me by letters patent, is the combination of ornaments on the three sided frame and blower, forming the front of a portable grate consisting of the swelled moulding *a a a a*, with sunken ovals and circles, the cross panel and gothic panel *e e e e*, and pilaster *g g*, and *l l l l*, on the said frame, and the similar gothic panel on the blower, all as herein before described and represented in the accompanying plate of drawings.
APOLLOS RICHMOND.

No. 232.—*Design for Stoves.*

Having thus fully described my improvement, what I claim therein as new, and for which I desire to secure letters patent, is the above described ornamental design and configuration of the plates, as described and represented.
JAMES WAGER.

No. 233.—*Design for Stoves.*

I claim as my invention or production, the above described and illustrated designs for six plate stoves, and desire to secure the same by letters patent.
JAMES WAGER.

No. 234.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the ornamental design of a stove plate, substantially as herein described and represented.
CALVIN FULTON.

No. 235.—*Design for Stoves.*

What I claim as new and desire to secure by letters patent, is the design and configuration of an ornamental stove plate, as herein described and represented in the annexed drawing.
GEO. W. CHAMBERS.

No. 236.—*Design for Stoves.*

What I claim as new and desire to secure by letters patent, is the design and configuration of an ornamental stove plate, as herein described, and represented in the annexed drawing.
GEO. W. CHAMBERS.

No. 237.—*Design for Stoves.*

Having thus fully described and represented the configuration and decorations of my ornamental design for a cooking stove, and disclaiming the mere details of ornament separately taken, what I claim as my design or production, and desire to secure by letters patent, is the combination of moulding and other ornaments, as applied, substantially according to the description of the several doors, panels, &c.
S. H. BURTON.

No. 238.—*Design for Stoves.*

What we claim as our invention and desire to secure by letters patent, is the configuration and arrangement of the ornaments herein described on the several plates of the stove.
SHERMAN S. JEWETT.
F. H. ROOT.

No. 239.—*Design for Stoves.*

What I claim and wish to secure by letters patent, as original with me, is the arrangement and combination of the several original and ornamental figures and mouldings upon this particular stove design, as herein described, and as represented in the annexed drawings.
WILLIAM SAVERY.

No. 240.—*Design for Stoves.*

What I claim as my production and ask to have secured to me by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawings, making an ornamental design for a parlor stove. S. W. GIBBS.

No. 241.—*Design for Stoves.*

Having thus described my invention of a design, I claim the ornamental border on the front plate A, the ornamental panels E, on the ash box B, the cornices G, on the top plate F, the grate ring H, with its chasing I, on it, and the foot or feet D, of the stove, as represented in figures 4 5 6 and 7, to produce a new and beautiful design for a stove, as set forth.

EDWARD B. FINCH.

No. 242.—*Design for Stoves.*

What I claim and desire to secure by letters patent, are the above described and illustrated designs for stoves. JAMES WAGER.

No. 243.—*Design for Air-tight Stove.*

What I claim as my invention and desire to have secured to me by letters patent, is the combination of the several ornamental mouldings, with the ornamental scrolls and clustered arrow-heads, cast in open work, and the whole forming a new design for the said top plate of a parlor air-tight stove.

MOSES POND.

No. 244.—*Design for Stoves.*

Having thus fully described and distinctly represented the shape or configuration, and the several ornamental designs for the panels, sides and doors of a cooking stove, what I claim as new therein and desire to secure by letters patent, disclaiming the mere details of the ornaments separately taken, is the combination of the ornaments and moulding as applied, according to the description to the several parts and configuration of stove, substantially as represented and set forth. HOSEA H. HUNTLEY.

No. 245.—*Design for Stoves.*

What I claim as my production, and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the said drawing, making an ornamental design for an air-tight cooking stove.

JOHN F. RATHBONE.

No. 246.—*Design for Stoves.*

What I claim as my design and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms represented in the accompanying drawing, making an ornamental design for a wood-stove.

JOHN F. RATHBONE.

No. 247.—*Design for Stoves.*

What I claim as my production and desire to secure by letters patent, is the combination and arrangement of ornamental figures and forms as represented in the accompanying drawing, making an ornamental design for an air-tight cooking stove. JOHN F. RATHBONE.

No. 248.—*Design for Stoves.*

What I claim as my invention and desire to secure by letters patent, is the design for a diving flue grate, as shown and described in the specification and drawings—figures A, B, C and D''.

ABRAM HANEY.

No. 249.—*Design for Stoves.*

What I claim as new and desire to secure by letters patent, is the design and configuration of ornamental stove plates, as herein described and represented in the annexed drawings.

SAMUEL CLARK.

No. 250.—*Design for Stoves.*

What I claim as new and desire to secure by letters patent, is the design and configuration of ornamental stove plates, as herein described and represented in the annexed drawings.

SAMUEL CLARK.

No. 251.—*Design for Stoves.*

What I claim as new and desire to secure by letters patent, is the design and configuration of ornamental stove plates, as herein described and represented in the annexed drawings.

SAMUEL CLARK.

No. 252.—*Design for Stoves.*

Having thus fully described and represented the configuration and decorations of our ornamental design for a cooking stove, what we claim as our design or production, and desire to secure by letters patent, is the particular configuration of mouldings around the edge of the doors, and the ornaments on their panels. We also claim the external plates of the stove, ornamented substantially as described and illustrated in the accompanying drawings. We also claim the ornamental pattern of leg, as shown.

CHARLES GUILD.
D. F. GOODHUE.

No. 253.—*Design for Stoves.*

Your petitioners claim to be the original and first inventors or producers of the combination of the ornamental figures constituting one design, as herein set forth.

WILLIAM B. CLINE.
SAMUEL HILL.

No. 254.—*Design for Stoves.*

What we claim as new and our invention, is the combination and arrangement of the above represented and described mouldings, panelings and configurations into an ornamental design for premium cooking stoves, and to be known and called as "Lamb and Harris' Patent Ohio Premium."

JOSEPH G. LAMB.
CONRAD HARRIS.

No. 255.—*Design for Stoves.*

What I claim as new and desire to secure by letters patent, is the design and configuration of an ornamental parlor stove, substantially the same as described and represented in the hereunto annexed drawings.

WM. L. SANDERSON.

No. 256.—*Design for Girandoles.*

I claim the said design or pattern, or combination of ornamental parts composing the same, in their arrangement in relief, as above described and as exhibited in the drawings.

WILLIAM F. SHAW.

No. 257.—*Design for Stoves.*

Having thus fully described the ornaments of my stove, what I claim therein as new and desire to secure by letters patent, is the combined ornamental design and configuration of stove, substantially as herein set forth and represented in the accompanying drawings.

HOSEA H. HUNTLEY.

III.

EXAMINERS' AND MACHINIST'S REPORTS.

PATENT OFFICE, January 1st, 1850.

Hon. THOMAS EWBANK,
Commissioner of Patents.

SIR:—In compliance with your request, I have the honor herewith to report proceedings in the discharge of my official duties during the past year.

The whole number and arrangement of classes and subjects before the office, are as follows:—

Class 1.—Agriculture, including instruments and operation.

Class 2.—Metallurgy and manufacture of metals and instruments therefor.

Class 3.—Manufacture of fibrous and textile substances, including machines for preparing fibres of wool, cotton, silk, fur, paper, &c.

Class 4.—Chemical processes, manufactures and compounds, including medicine, dyeing, color making, distilling, soap and candle making, mortars, cements, &c.

Class 5.—Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel.

Class 6.—Steam and gas engines, including boilers and furnaces therefor, and parts thereof.

Class 7.—Navigation and maritime implements, comprising all vessels for conveyance on water, their construction, rigging and propulsion; diving dresses, life-preservers.

Class 8.—Mathematical, philosophical and optical instruments, including clocks, chronometers.

Class 9.—Civil engineering and architecture, comprising works on rail and common roads, bridges, canals, wharves, docks, rivers, weirs, dams, and other internal improvements, buildings, roofs.

Class 10.—Land conveyances, comprising carriages, cars and other vehicles used on roads, and parts thereof.

Class 11.—Hydraulics and pneumatics, including water-wheels, wind-mills, and other implements operated on by air and water, or employed in raising and delivering fluids.

Class 12.—Lever, screw and other mechanical power, as applied to pressing, weighing, raising, and moving weights.

Class 13.—Grinding-mills and mill gearing, containing grain mills, mechanical movements and horse powers.

Class 14.—Lumber, including machines and tools for preparing and manufacturing; such as sawing, planing mortising, shingle and stave, carpenters and coopers' implements.

Class 15.—Stone and clay manufactures, including machines for pottery, glass making, brick making, dressing and preparing stone, cements and other building materials.

Class 16.—Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness.

Class 17.—Household furniture, machines and implements for domestic purposes, including washing, machines, bread and cracker machines, feather dressing.

Class 18.—Arts—polite, fine and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry.

Class 19.—Fire-arms and implements of war, and parts thereof, including the manufacture of shot and gunpowder.

Class 20.—Surgical and medical instruments, including trusses, dental instruments, bathing apparatus.

Class 21.—Wearing apparel, articles for the toilet, &c., including instruments for manufacturing.

Class 22.—Miscellaneous.

Class 23.—Designs.

Of the above twenty three classes, seven are apportioned to me for examination, viz:—

Class 5.—Calorific

Class 8.—Mathematical and philosophical instruments, &c.

Class 12.—Lever and screw power, &c.

Class 15.—Stone and clay, &c.

Class 18.—Arts—ornamental, &c.

Class 20.—Surgical and medical, &c.

Class 23.—Designs.

The whole number of applications referred to me, during the past year, is 481; 129 of these have been included in class 5; 43 in class 8; 35 in class 12; 23 in class 15; 46 in class 18; 47 in class 20; 74 in class 23; in other classes 84.

At the commencement of the year, there were 79 applications on my desk, waiting their turn for examination, at present there are 9.

Of the number of applications before me during the year, there have been—cases of interference 8; re-issues 7; extensions 3; additional improvements 5; appeal 1.

CLASSIFICATION OR DIVISION OF SUBJECTS.

The classification of inventions is a difficult matter in itself, from the fact that many of them are anomalous in character, while others are complex, or of a mixed nature, and might with propriety from any natural division of the subject be attached to any one of several classes. In the published digest of patents, the order of subjects has never yet been observed in strict accordance with the practice of the examiners, and its many defects and incongruities in this respect have led to frequent misapprehensions, and are well worthy of your attention with a view to future reparation. From the foregoing remarks it is obvious that a classification founded upon generic or specific distinctions cannot be completely carried out, although this is done in the main, the destination of doubtful cases being determined by common agreement. Prior to the late increase in the number of examiners, the whole range of subjects was divided between two examiners, imposing upon each the perplexing task of investigating subjects as multifarious as the workings of inventors' brains. The labor in this respect is now much simplified, though the constant increase of business requires severe and unremitting effort. Out of the 23 classes, I have now 7, but the subjects are not so heterogeneous as formerly, and during the past year a smaller number of applications have fallen to my lot, than to some other examiners.

PHILOSOPHICAL INSTRUMENTS, ETC.

Electro Magnetic ore Separator.—It is an old practice to separate iron filings from dust and particles of other metals, and also iron from its ore, by means of powerful magnets, the magnets in some cases being drawn through the mixed mass by hand, and then shaken or brushed, and in others the magnets have been attached to the periphery of a wheel or a drum, and either the mass has been dropped upon the revolving wheel upon one side, and the adhering iron removed by stationary brushes on the opposite side, or the magnets have been carried through the mass below, and the iron brushed off as before into a trough. By a process similar to this, the finest black sand has been prepared for many years. Much of the black sand now in use is colored, and is common siliceous sand, but the best article is a ferruginous sand, separated by magnets from the white, red and other colored siliceous particles. The ore separator which has been patented, uses electro instead of permanent magnets, rows of them being attached to a drum, the coils of wire surrounding the magnets being connected with a galvanic battery in the usual way, by one extremity, while the other is connected with a break piece or cut-off, in such a way as to charge the magnets while passing through the ore, and discharge them at the proper time for dropping the adherent mass of iron, and depositing it in a trough which is inclined, to convey it to its proper destination. The mixed mass of ore and earth is conveyed from under a hopper upon an endless belt, to the electro magnets.

Telegraphs.—A variety of inventions under this head, have been presented to the office, most of them based upon the electro-magnetic telegraph, or nearly related thereto. Prominent among these is the electro-chemical telegraph. Two patents have been granted for inventions of this kind, one of which has already gone into practical operation, to a considerable extent. These inventions were adjudged by the office to interfere with each other, and upon a hearing, priority of invention decided in favor of one of the parties. Upon appeal however, to the usual tribunal, it was decided that the alleged interference did not exist, and patents were ordered to issue to both parties. The whole case was one of unusual interest, involving many intricate and important questions, and although the whole proceeding was prior to your accession to the office, yet the leading features are doubtless by this time familiar to you. The parties, Sam'l F. B. Morse and Alexander Bain, came into the contest for priority of invention upon unequal grounds, the former being a citizen of the United States, and the latter a foreigner. It was held by your predecessor in office, that under the law a foreigner could not go behind his foreign patent or printed publication for evidence of his invention, and upon reference of this subject to the Attorney General, the opinion of the commissioner was confirmed. It was also held that in a contest for priority of invention, the sealing of a foreign patent was not to be taken as proof of invention, and that proof of enrolment was alone adequate. On the appeal to Chief Justice Cranch, the parties appeared by counsel, who occupied some

days in elaborate and lengthy arguments. It was, I believe, the first trial of appeal from the office, had in open court, and the whole case has been faithfully reported and printed at the expense of one of the parties. The report will be read with much interest by inventors and professional men.

The operation of the electro-chemical telegraph depends upon the chemical re-agency of the galvanic current. Marks or stains are made upon paper through which the galvanic current is made to pass, the paper being first saturated with some neutral or other salt, and moistened at the time to give it sufficient conducting power. The advantage claimed for this over the electro-magnetic telegraph, is that it may be worked with much greater rapidity. In the electro-magnetic telegraph a signal is made by the development of electro-magnetism, and the consequent movement of a small bar of iron, both of which operations require appreciable time. In the chemical telegraph the production of the stains or marks is commensurate with the passage of any portion of the galvanic current; for, according to the best authorities, the current could not pass through the salt without decomposition. The change of colors, as indicated to the eye, may not be so sudden as the transit of the current, but if it should not be so in fact, it becomes so practically, as the marks are not required to be seen at the instant of decomposition. I am not informed upon this point, but it is immaterial; the practical distinction between the chemical and electro-magnetic telegraph being this, that as it requires time to change and discharge an electro-magnet, and also to overcome the inertia of moving parts, there must be a limit in practice to the rapidity of making signals, while in the electro-chemical telegraph, the limitation would depend upon other causes, and the rapidity of action would probably far exceed the ordinary mechanical facilities for communicating signals. With a view to avail himself of this greater capability of this telegraph over the above, one inventor has patented a means of preparing and transmitting communications much more rapidly than the ordinary manipulations with the key. To accomplish this, strips of paper are perforated by machinery, in such a manner that the perforations may correspond to the signs representing the letters, figures or words, and by means of these perforations and the intervening spaces, or whole portions of the paper, the circuit is broken and closed with as great rapidity as a slight spring pressing upon the strip of paper can be made to act. It is only necessary that the motion of the paper at the other end of the line which is to receive the communication should move with a corresponding rapidity. In practice it has been found that the rapidity of execution is much less than it should be theoretically; but, nevertheless, it is far greater than with the electro-magnetic telegraph. With this, as with all the plans for telegraphs hitherto undertaken, a difficulty of some importance has been encountered, from the imperfect insulation of the wires, although great pains have been taken to render the insulation as complete as practicable, and several patents have already been taken out for telegraphic insulators. As the insulated supports for the wires have to sustain a considerable weight, they must be made of considerable strength; and, moreover, as they have been made the sportive targets of lawless boys, and objects of less wanton though more malicious mutilation by mischievous men, it has been found necessary to give a due share of attention to strength and safety in this respect, and in so doing some sacrifice of insulating properties have been thus far deemed necessary. A curious result follows from this want of insulation. If it be assumed that the air is impervious to galvanic electricity, all that can return to its source between

two distant stations, without travelling the whole distance, must pass down each post on the line, and can only reach the post through the substance of the insulating material employed, or along its surface in case it should be moist. A greater amount of electricity will pass down those posts nearest the station where the battery is in operation, and at the extreme end of the line only a feeble portion will pass through the instruments. The consequence of this has been, that upon the conductors being moistened upon their surfaces, the instruments at the distant stations would work with unequal power, and occasion much embarrassment. This difficulty is in some measure remedied, by having batteries at each end of the line, or at every station, although the defective insulation still exists for each. I am inclined to think, however, that the air, when loaded with moisture, is a conductor of galvanic as well as of mechanical electricity, as indicated by my experiments, several years since, with the immense copper roof of the Patent Office, forming a great galvanic plate of upwards of 20,000 square feet of surface. If it is sufficiently so to be of practical value, it is obvious that entire insulation of telegraphic wires will be difficult to accomplish.

The crossing of rivers and large bodies of water, by means of submerged wires, does not seem yet to have been attained, and the chief obstacle thus far is imperfection in the methods of insulation. The plan which I proposed several years since appears to be worthy of trial. It consists in using a local circuit and battery of quantity at each river or body of water. The galvanic current employed on the main routes are of small quantity and high intensity, hence a slight defect of insulation in a submerged wire would be productive of a great loss. But by using a current of quantity and the lowest possible intensity, to be set off by a local magnet, I am inclined to think that a single wire laid in the river with the most ordinary preparations for insulation, would be effectual in establishing connection between the terminations of the great line on opposite sides of the river or other body of water. It has long since been proposed to connect the eastern and western continents by means of telegraphic wires laid down in the depths of the ocean, and lately the proposition has been revived with a venturesome and true American spirit. It does not appear in any way impracticable to stretch a wire from the American continent to England; and in the waveless depths of the interminable waters, the wire would be more secure from depredation than upon *terra firma*. From its weight it would sink beneath the realms of the living monsters, and lie far out of reach from the ruthless hand of mischief or speculating avarice. But the insulation of such a wire is a thing not easily conceived of, in the present state of our knowledge. Besides the mechanical niceties required to obtain a complete insulating covering for the wire, we should have to contend against the corrosive action of the sea water, and this too, at a point where its greater density would exalt its chemical agency. Much has been expected and promised from gutta percha as an insulator, but we have not been long enough acquainted with this curious substance to test its value for this purpose. It is indeed a most excellent electric and insulator, but I have seen several instances of its decomposition when exposed to air and moisture, and some cases of its entire destruction when in thin sheets. I have been recently informed that the decay of thin sheets of gutta percha is attributed to caustic meterials used in preparing it; however this may be, I have seen supports for telegraphic wires made from the pure gum, undergo in one season decomposition to such a depth as to form a bibulous mass upon its surface, and materially impair its non-conducting property. It resists, however, to a remark-

able degree the action of strong acids, and may be used with great convenience for funnels, syphons, &c., for transferring and holding even strong nitric acid. It may not be out of place here to mention its unfitness, when in very thin sheets, for models of patented inventions. During the past year a patent was granted for a surgical instrument, an essential part of which was a sac of gutta percha. In the course of a few months the entire sac had disappeared, having crumbled into powder.

American Indicating Disc Telegraph.—An instrument under this name has been patented, which presented some ingenuity and novelty in the mechanical arrangements, and also in the selection and use of signals. It is an optical or indicating telegraph, as its name purports, and in this particular must yield to the recording telegraphs. The signs are indicated by the figures 0, 1, 2, 3, 4, these being the only symbols used. These stand for the vowels, and the remaining letters are represented by combinations of these figures. The figures are arranged in four sets, upon the face and near the circumference of a disc, which revolves by means of a novel internal escapement, which is moved by a lever attached to the armature of an electro-magnet. Its language is less complex than that of other indicating telegraphs.

Pen Telegraph.—When Prof. Morse's telegraph was first essayed in this city, it recorded the signs upon a moving fillet of paper by means of a pen charged with ink, the pen being supplied from a reservoir or fountain. It was found difficult to regulate the flow of the ink, more especially as the motion of the pen was apt to *throw* the ink, as it was termed, and the pen was accordingly dispensed with, and a contrivance substituted, by which marks corresponding with those made by the pen were indented upon the fillet of paper. This required some mechanical force, and it became necessary to have a local registering magnet, as it is called, of some power to supply this force. In the new pen telegraph the inventor has ingeniously reversed the order of Morse's telegraph, and moves the paper to the pen, which is kept stationary, thus obviating the difficulty of throwing the ink and requiring a slighter force to move the paper than is now required to indent the paper. The pen is also fed by an ingenious contrivance. A lever or arm carrying a feeder which dips into a fountain of ink, is operated at the requisite intervals so as to move up to the pen and deposite upon a proper amount of ink, and then retire again to the fountain to recharge. This arm carrying the feeder is actuated by the clock work which is used to move the fillet of paper. It was thought that this invention would save the necessity of using a receiving magnet, and that the telegraphing might be performed directly by the use of one magnet merely to move the paper to the pen. If, however, it fails to supersede the receiving magnet, it can have no advantage to recommend its use.

Painting Telegraph Wires.—A patent has been granted for a machine, for painting telegraph wires, to preserve them from rust. The invention is notable not so much for intrinsic merit or novelty, but as marking the progress and rapid extension of the telegraph, by the introduction of labor saving machinery, in the manufacturing departments of the art. Attempts have also been made, to patent modes of insulating the wires, and of forming them into ropes of suitable size and strength; and although the telegraph might have, and in some cases, has been benefitted by their use, yet they were not in the category of novel inventions, and could not be patented.

Mode of sustaining Telegraph Wires across Rivers.—Many attempts have been made to improve this part of the telegraph system, and generally but little difficulty has been experienced, except where the wires and piers might become an obstruction to navigation. If the piers are to be very far apart, there is danger of the wires breaking under their own weight, and more especially when loaded with ice. The plan in question proposes to suspend the wire to a cord of India rubber, stretched to its greatest tension or nearly so, or what is better, to inclose the wire in a tube, which is to be stretched over the wire, this would save much swagging of the wire, and as the India rubber is a very strong material in proportion to its weight, the invention appears feasible, and is at least very ingenious. I have not heard of its use thus far.

I have been somewhat lengthy and discursive on the subject of telegraphs, from the magnitude and importance of the invention, and its growing interest with the public, who will be gratified to follow closely every step of its development. The past year has been unfruitful in discovery, and in striking inventions. Political economists might attribute it to the distracted affairs of Europe, whence science has been wont to emanate, and to the visitation of pestilence and gloomy forebodings at home. But it is remarkable, that the close of the past year, and the few past days of the present, have shown symptoms of reviving energies in science, and its application to art, which will ring upon the year to come a cheering note of convalescence, and astound the public mind. Your examiners, and all engaged in the office, are interdicted from all communications, public or private, respecting unexamined and pending applications for letters patent. But I divulge nothing, and do no more than whet the keen edge of curiosity, by the prediction, that the coming year will be more fruitful than the past, both in discovery and invention. The world has never witnessed an invention so extraordinary in its conception and achievements, as the electric telegraph, carried to such a pitch of improvement and successful operation, in so short a time; but the end is not yet, and we shall soon see new powers and modifications brought into play, and this mysterious yet simple, infantile yet seemingly matured invention, is to receive new accessions, and grow into capabilities far exceeding our present expectations.

Signals upon Railways.—A patent has been granted for giving signals upon railroads, by means of electro-magnets, which may be considered a species of electro-magnetic telegraph. A spring or lever is so arranged upon the track, that when upon the passage of the cars, the spring is moved, it completes a galvanic connexion, with a wire to be connected with a given station ahead, where a concerted signal is shown by the operation of an electro-magnet, with a view to prevent collision of the trains. For instance, it may be readily understood, that the cars passing a certain point, may by ordinary telegraphic communication, convey that intelligence to any distance ahead, or in the rear if desired. On double tracks, such a device would not be needed, and it is evident, that if it cannot be made infallible, it would not answer in any case. A single failure to communicate, might mislead, and be the occasion of that very disaster, the invention was intended to obviate. From the frequent interruptions which occur in telegraphic lines, the invention could not at present be very reliable, and must be regarded as more ingenious than practical.

Railway Annunciator.—Another kind of indicator patented under the head of telegraphs, (although wanting the characteristic distinction of communicating at a distance) is an instrument bearing the above name. In principle, it is similar to an odometer, but might be appropriately termed an odoscope. The odometer is an instrument attached to the wheels of carriages, which by means of an index moved by a train of wheel work, shows the distance passed

over by the carriage; but this instrument is to show more than this, and informs the traveller where he is on the road, or the name of the place he is passing. For a taciturn people as we are, the invention may be styled an ingenious hit, where the travelling stranger is reluctant to ask, and every body appears too much absorbed to inform him of his whereabouts. The names of the various places on the route are marked upon a dial-plate, and the index or hand shows the cars to be at a certain place when it is over its name. The index revolves by a train of wheel work connected with the car wheel or axle, as in the ordinary odometer, the office of which it also performs. It has another convenience of giving notice to way passengers of the approach to their destinations, and to hold themselves in readiness for leaving the train without delay.

Education Tables.—A very ingenious and convenient device has been patented under this name, for facilitating instruction and practice in arithmetical calculations. Its details are not readily described, but its main features consist in a square board or table, furnished with a number of grooves, in which slide freely, little buttons or studs, having on their faces either figures or letters, or both. The buttons are so made that while they may be moved about easily in the grooves, they cannot be removed. The grooves are so arranged that a certain set of them is to be used for the calculation or spelling of words, while another set is to contain the letters or figures when not in use, and yet, whenever required, they can be moved at once to the scene of operation, without interfering with each other.

Calculating Machines.—Two machines for adding and subtracting numbers have been patented. The first of these has a fixed circle, graduated on its face into 100 equal parts, and numbered from 0 to 99. Concentric with this fixed circle are two moveable circular metallic plates, one within the fixed circle, the other surrounding it, and each pierced with 100 pin holes in its circumference, each pin hole standing directly against one of the numbers of the fixed circle. In operating, a pin is inserted into one of the pin holes of the inner circular plate, against that number on the fixed circle which indicates the units and tens of the number to be added, and the plate is then turned by carrying the pin round till it strikes a stop placed at the 0 of the fixed circle. This is repeated for each number to be added, and a square hole cut through the inner circular plate discloses the units and tens of the sum on a fixed graduated circle beneath. A similar square hole is cut through the outer circular plate, and discloses another set of numbers to indicate hundreds and thousands on a second graduated circle beneath. This second concealed circle, instead of being fixed like the before mentioned concealed one, moves backward one number for every complete revolution of the inner moveable circular plate, and thus adds one to the number of hundreds seen through the last mentioned square hole. If the number to be added contains hundreds and thousands, the pin is inserted into a pin hole of the outer circular plate against the number of hundreds and thousands, and the plate turned till the pin strikes another stop placed at the 0 of the fixed circle. The hundreds and thousands of the sum can then be seen through the square hole of the outer circular plate. This plate also bears a little roller, seen through another square hole in the plate, and which makes a tenth of a revolution for every complete revolution of the plate relatively to the graduated circle beneath it. The roller is numbered from 0 to 9, and shows the tens of thousands. It is connected with an additional small wheel bearing an adjustable index which indicates the hundreds of thousands of the sum.

The second instrument for the same purpose is very simple, though it will require greater effort of attention in its use than the preceding. It consists of a series of parallel sliders let into the face of a small piece of board with margins of suitable width left between them. These sliders play longitudinally beneath two stop bars crossing them at right angles, one at the right hand end of the board, the other near its middle. The space between the stop bars is divided into ten equal parts, and the nine points of division are numbered from 1 to 9 on the several fixed margins at the side of the respective sliders. These margins thus divided are called the indices. Through each slider are made nine equidistant pin holes, directly against the nine numbers on the indices, and the ten spaces thus formed are numbered on the slider from 0 to 9, and the series of pin holes is continued on towards the left, on each slider, till their number is at least doubled, and the additional space thus occupied is distinguished by coloring that part of the slider. Beginning with one side of the series of sliders, the first is made to represent units, the second tens, the third hundreds, &c. The sliders are operated by a pin inserted in the pin holes. The pin is inserted into the pin hole of the unit slider, against the number on the index denoting the units of the number to be added, and the slider carried to the right, till the pin strikes the right hand stop bar. The slider for tens is next moved in the same manner, by inserting the pin into the hole against the number on the index, denoting the tens of the number to be added, and the same process with the hundreds, thousands, &c. On making the addition of a second or more numbers, the pin is in like manner inserted into the hole of the unit slider against the number of units to be added on the index, and the slider again carried an additional move to the right, as before, and similarly with the tens, hundreds, &c. If, however, the sum should exceed 9 on any slider, it is known by the pin falling into a hole in the colored part of the slider, and in that case, the slider is not carried to the right, but to the left, till the pin strikes the left hand stop bar, and a unit must then be carried to the next higher digit of the number to be added. The units, tens, hundreds, &c., of the sum total will be found on their respective sliders at the side of the right hand stop bar. By a little practice, addition may be performed on this simple instrument with considerable rapidity. Neither this nor the preceding, however, can be of any practical utility, except to persons whose habits of mental computation are slow and inaccurate. Subtraction is performed on both instruments, by reversing the process for addition, but to great disadvantage, as the stops in both are then comparatively useless.

A Patent has been granted for an Instrument for measuring distances in reconnoissances.—Upon a tripod stand is mounted a horizontal axis, from which extends at right angles a radial arm, bearing at its extremity a telescope having its line of collimation parallel with the axis. The telescope is counterbalanced by weights on the opposite side of the axis. By making the axis revolve with the telescope and counterpoises, the telescope is with great facility and precision made to assume in succession two parallel positions, at the distance of twice the length of the radial arm on which it is mounted. On observing an object through the telescope in these two positions, the parallax will be apparent at a great distance, and its angular magnitude is measured by a micrometer attached to the telescope. The parallactic angle thus obtained gives the distance of the object, either by calculation or by reference to a table constructed for the instrument. It is said that this instrument may be made to measure a distance of forty or fifty

miles or more. If so, it must prove very valuable for reconnoissance in geographical surveys.

Clocks.—There would seem to be but little space left for improvement in clocks at the present day, but, like every other invention of man, it must have a long interval between a high degree of improvement and absolute perfection. Not much has been done towards filling this interval, but a patent has been granted for one improvement which may be of practical interest. This invention consisted in the employment of two coiled springs instead of one, to operate upon a pinion placed between them, for the purpose of equalizing the friction upon the bearings of the pinion. This device, or its equivalent, or certainly its analogue, is common in machinery, but it was deemed patentable in this instance, as, by its application to clocks, each spring could be made light, thin, and of better materials, in consequence of using two.

Spectacles.—Three patents have been granted for improvements in spectacles. The first to be mentioned is for a compound spectacle, or one in which several sets of glasses are used of different focal powers. There are several minor points claimed under this patent, but the principal feature is gearing the stems of the frames inclosing the glasses in such a manner that two glasses of one set shall move together and in unison. One other feature also of this invention is the mode of affixing the sliding handles in such a manner that they make a comparatively smooth joint, and avoid the annoyance so often experienced in common spectacles of catching in the hair.

The next patented improvement in spectacles to be mentioned is one in the slide merely, and accomplishes in a more perfect manner the object sought for in the last named invention. One half of each bow is made tubular, and the other slides within it with a neat fit, and the bows are not as heavy as in the ordinary spectacles, and there is, of course, no risk of entanglement with the hair.

The third improvement in spectacles relates to the lenses. Spectacles are frequently made with the upper and lower halves of the glasses separate, and of different focal powers. The dividing line is unsightly and unpleasant also to the wearer. The new method patented makes the glass for each eye entire, by grinding the upper and lower portions to different focal distances, and thus dispenses with the line which commonly gives to the glasses the appearance of being cracked. It will undoubtedly subserve the purposes for which it is intended, but it will at the same time be a difficult task to grind the lenses in this manner.

Transverse Callipers for measuring the interior of Casks.—A convenient instrument under this name has been patented, two modifications being presented under the application, one of them intended to measure the longer and the other the shorter diameter of the cask. The legs of a pair of common compasses bent about their middle nearly at right angles and crossing each other, will convey a good idea of the form used for measuring the longer diameter, or the distance between the heads. That for measuring the shorter diameter or the swell consists of two sliding arms attached to a rule or scale. These arms are inclined towards each other, making an angle of 45° with the rule, and, of course, a right angle between themselves; and, from the relation of the right angle to the circumscribed half circle, it is obvious that the instrument is philosophically contrived and well suited to its purpose.

CALORIFIC.

Stoves.—An interminable subject of invention and letters patent, is that of stoves, and each year exhibits some new phase, originating perhaps in accident. The current of invention and improvement in stoves and also in furnaces for steam boilers has had lately one principal direction, viz: towards the principle of perfecting combustion by the introduction in various ways of oxygen above the fire. The principle is an old one, and seems to have been most successfully carried out by Mr. Williams of England. In the foreign journals and patents the invention is styled a smoke consumer, and with much propriety, especially in those furnaces where soft coal is used. It is found necessary in all cases to heat the air prior to its introduction above the burning fuel, and the accomplishment of this has been the aim of most of the inventions lately presented. In some, the air is introduced through small apertures in the heated furnace walls, in others through hollow grate bars, in others through tubes passing up the sides within the fire chamber, and in another through a cylinder or casing surrounding the fire chamber. Another device in the management of furnaces for steam boilers upon which much contrivance has been expended, is the introduction of steam either alone or in combination with air, either above or below the fuel, or both. There have been so many modifications of the above principles, with but slight shades of difference, that it would be difficult to select any one as possessed of intrinsic novelty, the construction of the furnaces, or some parts, having been mostly the subjects of the patents.

Hollow Grate.—Rather a novel form of grate has been patented, which was made by surrounding a hollow cylinder, with leaves or flanges of suitable distance apart, and the whole mounted upon an axis to revolve within the fire chamber of a stove or furnace; the hollow cylinder was intended for a heater for air or water.

Ship's Caboose.—A patent has been granted for a ship's caboose, which served the additional purpose of a ventilation for the hold of the ship. The air supplying the combustion is taken from the hold of the vessel, and a ventilating pipe or jacket surrounds the chimney pipe to aid in the operation. The principle has been before used in ventilating dwellings, but its application in this instance involved some novelty.

Parlor Cooking Stove.—A stove of this class has been patented, presenting a convenient, and at the same time highly ornamental stove, and when out of use having no appearance of a cooking stove.

Patent for a Hot Air Register.—This register is designed for use with hot air furnaces. It is placed in the floor of the room as usual, and is moved and regulated readily by pressing the foot upon a wheel or segment which operates the valves or slats.

Patent for heating air by hot water pipes.—The hot water apparatus, as it is termed, is getting into extensive use for heating buildings, but has hitherto experienced a great drawback from leakage occasioned by the expansion of the pipes. The inventor in this case professes to have surmounted this difficulty by a novel arrangement of the pipes, and if so, has made a valuable accession to this article of comfort and luxury. He has a number of parallel ranges of parallel pipes, through which the water circulates in one direction only. Each vertical range has an independent vertical head, and are all connected at the top with one common head, and at the opposite end at the bottom with one common head.

Patent for a Self-igniting Lamp.—A welcome article to the lazy and luxurious. By pulling a string or turning a crank a friction match attached to an arm or wheel is made to rub against sand paper and ignite and moves onward to the wick of a small night lamp. It is to be placed by the bedside or any where in the sleeping room, and is further designed to be moved by clock-work, so as to light the lamp at any given time of night.

Patent for a Self-regulating Damper.—Self-regulating stoves have of late been much improved, and are now rendered so certain and reliable in their operation as to command an extensive patronage. The present invention is based upon Regnier's metallic thermometer. When a straight thin metallic bar is bent or raised by the middle, it forms a segmental arc, of which the *versed sine* is twelve times longer than the distance through which the extremity of the bar has moved. Such a bar, if fixed at its extremities, would bend by the action of heat upon it, and the great range of motion thus obtained offers an excellent means of operating the damper or register of the stove, which may be easily connected with or moved by the centre of the bending bar. This is the plan adopted in the self-acting damper before us.

Damper or Valve and Scraper for Stove Pipes.—This patented invention is simple and effective. Two rods take hold on opposite sides of a circular valve or damper in the stove pipe, and by pulling upon one rod and pushing upon the other, the valve can be turned into any desired position, and by pulling and pushing upon both rods, the valve which nearly fits the stove pipe, is carried back and forth and scrapes out the soot.

Patented Portable Lantern.—This invention was at first regarded as impracticable, upon the fact that the model presented being of full size, and designed for actual use, failed to effect the purpose of the invention. The draft usually in lanterns, is from below upwards, and the flame is apt to flicker from the action of currents of air. The inventor in this case, essayed a downward draft, closing the lamp entirely at the bottom, and admitting the air from above. It was also provided with a hollow conical reflector, the flame being under the centre of the cone. The draft being downwards outside of the cone, and upwards through its centre, and regularly converging all round the flame towards the central opening, the flame would be kept steady, and the reflector free from smoke. In the model furnished, the reflector was easily smoked, and the flame was feeble, owing to a want of draft. Another lantern however, was finally furnished which succeeded well, and the patent was accordingly granted.

FINE ARTS.

Musical Instruments.—A patent was granted after much difficulty, for an improvement in the melodeon, consisting in making the sounding board one of the walls of the air chamber or wind chest. A full size instrument was brought to Washington, to exhibit the improvement. It certainly had a superior tone, but I think it questionable whether it was all due to the thing claimed.

A patent has also been granted for an improvement in the sounding board of the piano forte. The inventor employs a sounding case, made of thin boards, perforated on the top of the case, and the case is detached from the frame of the piano forte.

Musical Notation.—Of the many new systems of musical notation, which have been before the office, very few have ever been regarded as anything

more than arbitrary selections of signs, innovations and not inventions. A patent has been granted during the year, for a new system of musical notation, which is based upon important principles, and has been the source of much excitement in the musical world. This system does away with the signatures of flats and sharps, and accidentals, and greatly simplifies the reading of music. Should it answer all its pretensions, it will have much to contend against, before its general adoption. Scholars and masters will have to unlearn, and the vast quantity of printed music now in use, and on the hands of dealers, would be sacrificed. Thus far, I am informed, the most skilful musicians cannot bring any serious objection to the system.

New Flute.—A patent has been granted for an improvement in this instrument, of considerable interest to musicians. A and E natural are the poorest notes upon a flute, and cannot be sounded with as much volume as other notes, in consequence of the smaller size of the holes, for the third fingers of the right and left hand. The inventor has found, that if these holes be carried lower down upon the flute, they can be made larger, and thus give full tones. But in carrying them farther down, the interval would be too great for the spread of the fingers, and to accommodate the flute to this change, he has provided a key for these holes, which is touched by the fingers at the same point on the flute, as the former small holes, and thus to the player there is no essential change in the mode of fingering.

Patent for an Instrument for forming the touch upon the Piano Forte.—The patentee of the new musical notation, has also taken out a patent for an instrument, which may be considered an improvement upon the old chiroplast.

Patent for a Music Stand.—An instrument not readily described, but whose purpose is to turn the leaves of music books by the pressure of the foot upon a treadle. A very ingenious and serviceable invention.

Patent for a machine for Folding Paper.—This curious and quite novel instrument, folds the paper by passing it between pressure rollers, and works with great rapidity. It is too complicated to receive more than this passing notice, of its main principle of action.

Patent for a Paper Filer.—A neat contrivance, consisting of a tin box with a hinged cover folding over its end, and part of one of the sides for securing the papers, and an open space on two sides of the cover, allowing an easy inspection, withdrawal and insertion of the papers.

Patent for a Daguerreotype Case.—An invention of a lady, consisting of a conical glass case, blackened on the upper half of its inner surface, and ground on its lower half to admit the light necessary for viewing the picture, which is secured in the larger end of the case, the smaller end being provided with a magnifying lens, through which the picture is to be examined. In the ordinary examination of these pictures, every one must have observed the difficulty of getting a proper light. The specular reflection of the plate interferes with the view, and it is necessary to admit the light to the plate laterally, and hold over it some dark or absorbing surfaces. Persons wearing dark dresses can generally obtain a good position, without much trouble. This inconvenience is obviated by the invention, and as the picture will bear magnifying with advantage, the lens comes in opportunely for this purpose as well as that of closing entirely the glass case, and preserving the picture from dust and exposure to the air.

Holding Daguerreotype Plates.—Two patents have been granted for inventions for holding the plates while polishing. They are both clamps of novel construction, one intended to hold the plate upon a polishing wheel, and the

other for holding it upon the table or bench, while polishing with the buff-stick; both of them apparently good inventions.

Patent for a Branding Tool.—Branding tools are usually heated in the fire preparatory to use, and this operation must be often repeated. The invention removes this necessity, by placing the branding letters at the bottom of a kind of portable furnace for charcoal, attached to a lever or handle for using and moving it about.

Patent for Surfacing Floor Oil Cloth.—This operation has been heretofore conducted by hand, with great labor and expense. By this invention much labor and time are saved, the operation being performed chiefly by machinery. The canvass is stretched upon a proper frame or support, and a series of revolving arms, furnished with pumice stones for polishing, are affixed to a carriage travelling back and forth upon a railway, the whole length of the canvass. A man walks back and forth with the carriage, turning the crank for revolving the rubbers, and thus will finish as much cloth in one day, as could be done by three or four men in the old way.

Patent for a method of stretching Painters' Canvass.—An invention apparently so obvious as to excite some wonder that it had never been adopted before. The frame has a mitre joint at the four corners, and the sides are separated for distending the canvass by the insertion of wedges at the joints. It is furnished also at angles, with metallic slides, to keep the sides always at right angles.

Patent for making Dissected Maps for the Instruction of Youth.—These maps are generally made up of pieces of wood cut from a thin board, and have always been liable to warp so as to spoil the figure of the map, when made up. The inventor in this case cuts the pieces in the direction of the grain of the wood, from blocks previously prepared for the purpose. The paper upon which the map is already printed, is glued to the block of wood before it is cut, and by means of suitable dies, the sections are cut out with ease and accuracy, there being as many dies as sections.

SURGERY.

Distending Pessary.—A novel instrument of this sort has been patented, in which an India rubber pessary was used, and distended with air after its insertion, by means of an India rubber bag attached to it by means of a stem. It is also applicable to stopping hemorrhage from the uterus, rectum and other organs.

Patented Lung Protector.—A simple and ingenious instrument, to be placed over the mouth and nostrils, having two valves, one for inspiration and the other for expiration. The induction or inspiring valve may admit air through a sponge or heater, and the eduction valve opens to the air. One valve is operated by one nostril, and the other by the other, so that the air which has been breathed does not pass through the chamber which admits it, as it does in the common respirators.

Milk Exhauster or Instrument for Milking Cows.—A curious device to save labor. Mechanical means have been before used to draw milk from cows in cases where there was an accidental or natural obstruction, but this invention is to milk cows by the wholesale. It will probably answer well in many cases where the cow will submit to its use. It consists merely of a probe and canula attached to a sac of India rubber or gutta percha. The canula or tube of silver is inserted into the teat, being led by a probe which projects through it, and when the tube is far enough, the probe is withdrawn, and the milk flows in a continual stream. The sac is made like a glove finger, and is tied around the upper part of the teat, serving to hold the canula in place, and keep the teat warm, which is supposed to be an object.

Some isolated cases not regularly included in my classes, have passed under my hands during the year. Among them is a patent for a *method of making soda water.* When soda water is made from the powders, it is difficult to drink it all before the effervescence subsides. The improvement consists in providing a little cage of silver wire gauze, which contains the powders, and is dropped into the tumbler of water, when the effervescence will proceed slowly. The powders may be together in one cage, or in separate cages.

Patented Hook and Eye Tape.—The hooks and eyes are put upon tape, ready for use, instead of being sewed upon a card. To effect this, the eyes and hooks are made of a different shape from usual, the eyelets through which the tape passes being made oblong instead of round. The mode of threading them upon the tape, does not of course need explanation.

Patented mode of attaching Hooks and Eyes to Cards.—An invention of some importance to the manafacturers, inasmuch as we are told the mere operation of stitching hooks and eyes to cards, is to one establishment altogether an expense of ten thousand a year. In this case the hooks and eyes are not sewed to the cards, but the hooks are passed through two openings in the card, and the eye hung to it. The card is slightly crimped between the two openings, so that the eye cannot drop off. It saves an immense deal of time and labor, and is much more convenient to the consumer; for a single hook and eye can be taken off by itself without disturbing others, which is not the case with the old plan, where cutting the string to one, loosens the whole.

Atmospheric Churns.—The subject of churns belongs to the class of agriculture, which class will be reported upon by the Examiner having that branch in charge. In consequence of an unequal apportionment in the number of cases, I have had during the year 49 applications transferred to my desk, and among them 21 applications for churns. Most of these were styled atmospheric churns, and since I have been in the Patent Office I have never witnessed such a *mania* upon any one invention. The first impulse seems to have been given by the grant of a patent for a churn in which there were boxes upon opposite sides of a common revolving dasher, so situated that as the dasher revolved, the box containing the cream, with its open mouth downwards, carried down a portion of air to the bottom of the churn and as the mouth of the box inclined upwards, the air escaped from it through the mass of the cream, while the box itself filled with the cream, and as it came out and revolved in the upper part of the churn above the cream, that contained in the box was thrown out and scattered into spray. Both the descent and size of the box occasioned a commingling of the air and cream, and answered the purpose of agitation as well perhaps as any form of dasher. In the report of last year the rationale of atmospheric churns was given. It may be well to repeat that the introduction of air plays no chemical part in the production of butter, its separation from cream being merely a mechanical process. And although the atmospheric churns operate to a considerable advantage, yet it is by means of more thorough agitation, which is increased greatly by the diffusion of air throughout the cream. As each portion of air rises through the cream it forms a bubble upon the surface before it escapes, and in some of the atmospheric churns where the dasher is constantly submerged, the whole mass of cream is converted into a complete mass of foam.

From the success of such a churn as that above named in producing butter in a shorter time than other churns, a most enthusiastic speculation was at once commenced upon atmospheric churns, and inventive powers were racked to modify, mystify and contort a simple principle, with a view of producing novelties rather than improvements. From the immense number of churns used throughout the country great gains could not fail to follow the monopoly of a new and superior churn. The golden prospects have tempted many into the field, and it is quite curious to observe in this instance the natural drift of intellect, bringing the workings of independent minds into one common channel. A patent was granted for one species of atmospheric churn, but before this could have been known far beyond the walls of the Patent Office, two other inventors, each and all from different parts of the country, had laid claim to the identical improvement. One was from Ohio, the second from Illinois, and the third from Vermont. An interference was accordingly declared, and no sooner had the decision been made in favor of the patentee than three other inventors were found pressing their claims to the same invention. It presents an unprecedented case in the history of the Patent Office of seven persons, each a *bona fide* inventor, all claiming the same thing and about the same time, and all from distant portions of the country. This improvement consists simply in boring a hole through the entire length of a common upright churn dasher, and placing a valve either at the bottom or top of the dasher. This valve opens downwards, and when the dasher is raised with such rapidity that the cream cannot follow up, the air rushes down through the valve under the dasher, and upon the downward stroke the air is pressed out laterally and escapes by the side of the dasher and up through the mass of cream. It requires not a very quick motion and but little force to effect this, and the agitation is most complete. A full size model was exhibited in the office showing the operation with clear water only. Upon agitating the dasher, the water appeared as if in intense ebullition. Another peculiarity belongs to this churn worthy of note. In the common churn the dasher has to be raised out of the cream at each stroke and plunged down with some force, and as this scatters the cream, it is necessary to cover the churn tightly and allow the dasher to play through a small hole in the centre of the cover; but in this atmospheric churn the dasher is kept always under the surface of the liquid, and consequently there is no splashing of the cream, and the cover may be left off with safety, and enable you to watch the operation. A strong recommendation is its simplicity, and as one of the inventors stated he could alter any common churn dasher to this principle for twenty-five cents.

Prior to this simple device for introducing air, several complicated inventions had been patented, and many more made and presented to the office to effect the same purpose. In truth this invention at first was not considered patentable, but after the exhibition of its actual operation by one of the inventors, a different view was adopted and a patent ordered to issue. As atmospheric churns were not new, the ground was taken that the use of any known means of introducing air was not patentable. The ground of action is correct in itself, but did not appear applicable in the case after a personal explanation from the inventor, and an exhibition of the operation and result of his invention. The patentability of an invention frequently turns upon a nice point, and inventions the most novel are sometimes the most worthless, while again others least novel in appearance, bearing the similitude of common and unpatentable devices, are most valuable and important in practice.

Simplicity is the essence of true invention, and it is often interesting to see after a multitude of complicated inventions to attain a certain end, some discerning, or perhaps fortunate inventor, demolish a whole labyrinth of combinations, and arrive at the result by means so simple as almost to rob invention of its charms. Such means as one would suppose should have been the first and not the last resort. Mingled with the surprise are often times feelings of regret and chagrin by his competitors, that they had not discovered this most obvious path. To such cases the words of Milton are quite apropos:

> "The invention all admired, and each how he
> To be the inventor missed; so easy it seemed,
> Once found, which yet unfound, most would have deemed
> Impossible!"

Such cases are the most embarrassing to your examiners. If measured by the length and breadth of novelty, little is to be found, while yet the measure of utility has in no way been made to appear. But to return to the churns.

A modification of the last named churn has been patented, in which the hole in the dasher at the lower part was large enough to contain a solid plunger, fitting loosely within the dasher, which acts the part of a second valve. There have been also several patents granted for ingenious forms of rotary atmospheric churns. These inventors crowded upon the office so numerously, that they were examined with the most rigid scrutiny, and on several occasions, actual demonstrations by experiment of making butter, was required of the applicants, to satisfy the office that the inventions claimed justified their pretensions to be real improvements. In most of these cases, the results were unfavorable to the inventor; but in some, patents were ordered to issue. On one occasion an experiment was performed (humorously characterized by a bystander as a "churn race,") between a patented and a new churn, in which they both came out alike, making butter from new milk in two minutes and a half. Such a rapid separation of the butter, however, is by no means desirable, although this is the general aim of these improvements. We have it upon the highest chemical authority, that butter made so rapidly is not likely to be so good as that which is made slowly.

The above is a brief view of such patented inventions as have seemed to me to be notable among the many referred to me for examination during the past year.

Respectfully submitted,

CHAS. G. PAGE, *Examiner.*

PATENT OFFICE, December 31, 1849.

SIR:—I have the honor to submit to you the following report of the progress and condition of business at my desk for the current year, and of the improvements which have been developed at this office, in the classes under my charge. It has not only been my duty to examine such applications as have been referred to me during the year, but also a large number of cases, which, in consequence of previous inadequacy of force, had accumulated upon my desk.

At the commencement of this year, there were 175 applications awaiting my action; of these, upwards of twenty were transferred to one of my colleagues, and the number of cases referred to my desk during the year is about 512. The number of applications therefore, whose examination has devolved upon me, is about 666; and these have all received from me the examination and actions appropriate to them. This I believe is a larger number of cases than was ever before examined by one examiner in the same length of time.

The number of applications passed at my desk for patents, is about 270; and the number of rejections is about 460; making in all 730; whereas, the number of patents and rejections at my desk, while occupied by my predecessor, at no time exceeded 425 in one year, and it is believed that this number was universally admitted to be all that any examiner ought to be expected to make. You will, therefore, readily perceive that the accomplishment of so much labor, has required the most intense and unremitting exertions, "in season and out of season," during the whole year, and such as few men can continue for a series of years, without a sacrifice of all recreation, and ultimate destruction of health and mental energies.

The number of applications filed in this office during the present year, exceed that of any preceding year by nearly 300, and the current business of the office, without further increase, will severely tax the energies of the present examining force; and should the business increase as rapidly during the year 1850, as it has during the year 1849, it is very doubtful whether it will be in the power of the present force to keep up with it. It will be impossible for the examining corps to labor as they have done for the past year—a little relaxation is indispensable.

In stating that the number of rejections at my desk is 460, I do not intend to be understood that so many applications have been finally rejected. Many applications, after one set of claims have been rejected, are amended, and returned for a new examination, upon new or amended claims, requiring the same labor on the part of the examiner, as new applications, and are reported as such. Thus, one application may be *several* times rejected, and each rejection is reported. The whole number of applications finally rejected at my desk, probably does not exceed 400; and repeated rejections of the same applications, in modified forms, swell the number of reported rejections to 460, which is a fair index of the amount of labor required to dispose of about 400 cases.

It will be perceived, that the number of patents compared with the number of applications rejected, is as three to four nearly. I have had occasion to remark in previous reports, that the number of patents cannot increase in proportion to the number of applications. The field of invention in many of its departments is limited; and every year must necessarily circumscribe it still more narrowly, leaving little to be invented except what has been invented previously. Although many inventors are familiar with what has been done in those branches of the arts to which their attention has been directed, yet the number of those not thus informed, is very great; and as the field becomes more and more occupied, this latter class can do little else than re-invent what has previously been known, and their exertion and sacrifices must finally end in bitter disappointment.

The spirit of invention, although laudable in the highest degree, appears to be stimulated, in many cases, beyond a healthy action, and many are wasting their time and substance in attempts to improve branches of the arts with which, in their full extent, they are unfamiliar, and in so doing produce what has long since been exploded, or is already in extensive use. As many patentees have been eminently successful, and as a happy hit has sometimes brought wealth and distinction, multitudes are induced to follow the example of their inventive predecessors, and ultimately find themselves less fortunate, if not less capable, than those whom they have attempted to rival. The evils arising from a want of information, can never be in any considerable degree removed. Something can and should be done for the dissemination of knowledge; but knowledge sufficiently comprehensive and minute, to guard against the reproduction of things old, and to guide uniformly, or generally, to that which is new and useful, has never been possessed by inventors, as a class, and never can be possessed, except by comparatively few. The subject is too vast to be generally understood, and if every village in the country were provided with a good artistic library, still multitudes of applications for patents would yearly flow into this office, presenting no approach to novelty. It is not that this most useful class of men are unwilling to labor and investigate; it is not that they are deficient in capacity; but, I repeat, the difficulty is incident to, and inseparable from the vastness and variety of the subject. The poor inventor has not *time* to make the requisite investigations, and when he has made an improvement which appears to him new and useful, it would be much more economical to apply at once for a patent, than attempt to explore the almost boundless and ill-arranged masses of information to be found in the books, the shops, and in the archives of the patent office. As well might it be expected that farmers, mechanics, and merchants *generally*, should become sufficiently acquainted with law to master every legal question which arises among them, as that inventors could command the time to amass all the information necessary for their guidance among the shoals and quicksands which surround them. I speak with the confidence of experience, when I say, that a good knowledge of law is much the most easily acquired of the two, and does not demand that knowledge of foreign languages which is nearly indispensable to the successful study of the arts. Law libraries are very common, but there are few lawyers except those who devote their lives to the science; and a similar fact has ever been, and ever will be observable in matters connected with a knowledge of the condition and history of the useful arts. As I have remarked, something may be done for the spread of knowledge; but after all, the inventor, as time passes on, however warily he may select his paths, will more and more frequently find himself treading in the footsteps of his predecessors. Plants cluster about our paths, and flowers bloom; yet there are few botanists. The stars blaze above us, and the planets fulfil their orbits in the sight of all, yet there are few astronomers; and in like manner machinery performs its wondrous office, but there are few mechanicians; and the attempt to condense mechanical knowledge within such limits as to be conveniently reached by all, would be like an effort to receive and compress the waters of the Mississippi in a demijohn. The difficulties which now exist

are incident to the vast compass of the subject, and they will increase with the progress of time, and no human effort can diminish them. He who acquires a knowledge of these subjects, will do it by years of severe study, under any system that can be devised—an amount of labor not to be expected; and the number of rejected applications must therefore increase, and the number of patents diminish. But one appeal has been taken from decisions made at my desk since 1846, and that one has recently been dismissed by his honor the Chief Justice of the District.

The classes under my charge are the following, viz:—Mills, comprehending all kinds of machinery for grinding and crushing, horse powers, regulators and mechanical movements generally.

Land conveyance, comprehending all kinds of vehicles and implements of of travel, and transportation by land.

Machinery for working in lumber, comprehending saw-mills, planing machines, stave machinery, shingle machinery, boring and mortising machines, and the various implements and tools used therein.

Hydraulics and pneumatics, comprehending water wheels, wind mills, machinery for raising water, fire engines, filters, hydraulic engines, &c.

Manufacture of fibrous and textile fabrics, comprehending hemp brakes, cotton gins, wool pickers, carding machines, wool combers, spinning machines, looms, cloth dressing machines, &c., &c.

These several classes, in so far as improvements in them have been developed before me, I shall review as concisely as possible; the constant influx of business leaving me no leisure to extend my remarks.

MILLS.

Twenty-four patents have been granted within the year, for inventions in this class. Until somewhat lately the idea seems to have very generally prevailed, that the products of grinding were in danger of passing too rapidly from between the stones, thereby failing to become sufficiently ground; and various devices have from time to time been invented, to prevent burning the flour without hurrying it through the mill. A different notion however, has within a few years past begun to prevail, and it is believed to have been successfully reduced to practice. Air has long since been introduced between the mill stones for the purpose of cooling them; but the modification above alluded to, is the introduction of a powerful artificial blast, at the eye of the stone, in such manner as to force the flour, &c., much more rapidly through the mill than formerly. It is said that upon this plan, the grinding is perfect, and much more rapid, and that the flour does not remain long enough between the stones to be burned, and that even a hot blast may be used to advantage. Patents were granted in Europe and this country, for this discovery a few years since, and letters patent have been granted this year, for improvements in this variety of mill. The stones have been dressed in such a manner, as the patentee thinks will make them act more advantageously in connection with the blast, to wit:—the furrows in them extending but a short distance from the eye, and the remainder of the grinding surface is left smooth; fixtures are also buried with the eye, the better to keep it closed, and for the better regulation and distribution of the feed.

Letters patent have also been granted for a mill, having three cylinders with smooth surfaces working together, and having alternate reciprocating motions, and hollow axes to admit air within the cylinders, to prevent heating.

Letters patent have likewise been granted for an ingenious mode of forming and balancing millstones, which cannot well be understood without drawings.

A patent has been granted for a compact combination of a mill, with a bran duster upon the same shaft, and capable of convenient and separate adjustment.

The subject of bran dusting has received more attention than usual during the present year, and several patents have been granted for improvements in machinery made for that purpose. It is found that sufficient is saved by the process to justify the construction of nice bran dusters, and improvements in them are eagerly sought for. They are generally applied after the principal portion of flour has been separated from the bran by the bolt, (though sometimes used in immediate connection with the mill,) and their office is to separate that portion of the flour, which adheres somewhat closely to the bran, and discharge it into a proper reservoir. Of course they therefore generally consist of finely perforated surfaces, with brushes or similar appliances between which the bran is rubbed or scoured, the flour passing through the fine perforations. Various devices, generally fans, are used to produce a current of air, for causing the flour to pass through the perforations. It will readily be perceived that the machines are very simple in their nature, and susceptible of but few improvements, and that these must consist principally in slight differences of arrangement of the parts, and changes of form, for the purpose of exposing greater surface with the requisite compactness, and facilities for circulating the air, to carry out the fine particles.

In some of these machines, the air is made to pass through the mass of bran during the rubbing operation, the more entirely to effect the separation, and the perforated surfaces are confined to the lower end, or that part of the machine where the flour passes out. In one of these machines, patented within the year, two discs are used, having conical teeth corrugations working into each other between which the bran is carried, by a current of air. These discs are placed in a horizontal position, and one or two of the corrugations rising from the lower disc, are perforated to allow the flour, while the mass is agitated by the teeth, and carried up over the corrugation, to pass through with the air, which escapes through the perforations. Around the whole there is a gauze cylinder, through which the flour passes, with openings in it for the discharge. The wings are so arranged as to cause a portion of the current of air to pass through the perforations in the projections, from the disc carrying the flour with it, while the rest of the air passing up over the projection, carries the bran forward and discharges it. This machine seems at once compact and effective; and slight improvements in such machinery produce important savings.

But it is unnecessary for me to enter into a particular description of these machines, which cannot greatly differ from each other in principle. Patents upon such machines are liberally granted, because slight changes in them, which would be of no importance in machinery generally, often produce marked results, and require contrivance, instead of mere mechanical skill, to produce them.

Letters patent have been granted within the year, for improvements in flouring, consisting rather in change of process than improvement in machinery. The idea of the patentee, is that sufficient grinding to properly pulverize the glutinous part of the wheat, which adheres directly to the hull, is greater than the starchy part will bear without injury, and that the flour is materially impaired by losing any considerable portion of the glutin. His object therefore,

is to use such a process as will preserve the glutinous matter in the flour, at the same time protecting the starchy parts from an injurious degree of grinding.

To effect this object the patentee uses two mills and two sets of bolting apparatus. The first grinding is usually light, simply sufficient for the softer parts. The products of this grinding are bolted in the usual way; the bran is then passed immediately to the auxiliary mill, where it is subjected to severe grinding, at a very high speed of the runner, which effectually grinds the hard matter adhering to the hull. The products of this grinding are carried immediately to an auxiliary bolt, where the remainder of the flour is separated from the offal or bran. The flour of the various qualities obtained by this last bolting process is immediately returned to the cooler, or to the first bolt, and is bolted with the products of the first mill. The different matters of which the wheat is composed are ground in a manner adapted to them, and the whole of the flour is finally bolted together and properly mingled.

Some other improvements in flouring have been patented, but it is unnecessary to give a particular account of them. They are generally slight, and not of a radical character.

Horse Powers also belong to this class, and two or three patents have been granted for improvements in them. Any one who will consider the field to which inventors of horse powers are limited, and the great number of those who have exercised their ingenuity upon the subject—the many inventions, or alleged inventions, and the few points of real improvements which can even be aimed at—will not be surprised that there are but few patents granted for horse powers, and that the inventions patented are for small improvements.

One of the patents above mentioned is for an improved arrangement of gearing, for the purpose of increasing speed and giving steadiness in a compact manner. I could not give a clear idea of the arrangement of parts without drawings. Another is for arrangement of springs upon the cog wheels, which will compensate for slight irregularities of their form, and will relieve them also in cases of sudden jerks, which might endanger the machinery. Devices somewhat similar, and for similar purposes, have already been used, and there was but little novelty presented. Another patent was granted for an improvement in constructing and uniting the parts of very large master wheels for horse power, for the purpose of obtaining the requisite speed, with little gearing, and consequent avoidance of friction. There is very little patentable novelty in the wheel, but it seems very useful in this kind of horse power.

Two beautiful improvements in hanging mill shafts have been patented within the year, combining great simplicity of construction with very perfect adjustability and neatness.

Having devoted all the time to the examination of this which I can command, and perhaps all that the subject demands, I will hasten to the next, which is—

LAND CONVEYANCE.

Thirty-seven patents have been granted for improvements belonging to this class, comprehending wheels and axles—springs, comprising brakes, &c. &c.

Two or three patents have been granted for improvements in dumping carriages, or vehicles whose bodies tilt for the purpose of discharging their loads. Many carriages and carts of this class have long been known, and there is very little novelty in what has recently been done. One of the cars is so constructed that the body slides backward on friction rollers, and is tilted in that direction. The friction rollers are arranged in levers, so that when it is desired to move the car body they can be so raised as to support the body; but when it is at rest the rollers sink into the mortises and the body is firm. Another of the cars discharges its load at the sides. The body is composed of two distinct parts, which rest on sectors, with teeth and hooks, so that when either part is tilted it is carried towards the side, and continues sufficiently elevated to clear the wheels.

Three or four patents have been granted for car couplings. One of these is intended for a buffer also. The ends of the rods from each car clasp a cylindrical block, to which the link is connected in such a manner as to form a joint. The link is at liberty to move vertically with the block, thus allowing another motion to the connecting parts. Eccentric bolts are put through the connecting rods and links, and these bolts have their ends connected in such a manner that the buffers can be pressed as closely to the cylindrical block as may be desired for the joint. In another of these couplings, the link, in connecting the cars, acts against spring guides, which, except when the cars are coupled, hold the bolts up out of action. The link presses against the spring guide, which retires before it until the link comes into position, when the bolt passes through the link and the cars are coupled.

Another self-coupling apparatus, which I will notice, consists of two spring hooks, jointed to the coupling bars or rods by pins passed through the end opposite the hook ends, and a little back of the ends of the bars. At the ends of the coupling bars there are cross bars or catches to receive the hook. As the cars approach each other the hooks or catches both slide over these bars and catch each to the opposite car. Thus the cars are held together by two hooks at once, without a link, and both ends of the cars being armed in the same manner, they are prepared to be coupled by a self-acting apparatus, which ever end may happen to be brought together. Thus the necessity of changing the links, when the cars change ends, before the cars can be coupled, is entirely obviated by the most simple device. When the hooks are in action they are held down by springs.

Several patents have been granted for improvements in *Carriage Springs*. One of these consists in so crimping or corrugating the flat or elastic spring that it may readily yield to the necessary extent endwise to such shock as may render such yielding necessary. I have not seen these springs in use, but they may answer a good purpose.

An improvement has been patented in spring reaches, which appears to obviate some of the objections heretofore urged. If the springs are arranged in any of the modes heretofore patented, a compromise must be made and one objection must be overcome by introducing another. It seems, however, that by a system of diagonal bracing among the springs—a system differing very little in appearance from what was previously known—the benefit of the springs can be retained while the objections to them are much diminished.

A mode of preventing the lateral and end motion of carriage bodies has also been patented. Braces for this purpose, in ordinary use, become less

tight as the carriage body sinks by weight, or by passing over impediments, and, therefore, do not retain it at all times with the same certainty and steadiness. The patentee connects the sides and ends of the body with the reach near its centre by rods connected with opposite edges of a plate, or its equivalent, playing up the reach like a fifth wheel. As the body moves, therefore, the practical length of the braces will continue nearly the same, and obviate, to a great extent, the objections above mentioned.

An improvement has been patented in hanging car bodies. These springs have before been used in a manner somewhat similar, but in the present instance the tubes for guiding and protecting the springs are made a part of the boxes for the axles,—thus making a neater, more compact, and simple fixture. The springs and spring cases work in pockets in the side rails of the truck frame.

I will notice one other patented spring. It consists of two plates placed parallel to each other, with circular rows of pins placed between them, and supported by them in a position perpendicular to them. Space is left between the plates sufficient for the introduction of India rubber bands of sufficient strength. Each plate is then divided into two equal parts, the separations being opposite to each other. Strips of India rubber are then placed around the different rows of pins. It will be perceived that the frame work, or case of springs, is divided into two parts, and that when the opposite plates are bolted together, each part, by the use of the ears, may be connected in the usual manner, and the spring brought into action. The strips of India rubber should be placed in such a manner as to have different degrees of tension, so that the springs may become stronger and the tension may increase with the weight.

Some eight patents have been granted this year for improvements in iron wheels for cars and carriages. In one of these, the hub is made and the spokes connected with it in the following manner: An external casing, in the form of the hub, is made of sheet metal; an internal tube is then made of the same metal, with flanges at its ends to fit the outer casing, having a space or hollow ring between the outer casing, the tube, and the flanges. Openings are made in the outer casing, and the spokes are inserted with the ends resting against the tube; fused metal is then poured into the hollow space in the hub above mentioned, which cooling, fastens the spokes to the hub.

Another very pretty wheel, especially for carriages, has been patented. This wheel is made in the usual way, except the rim and tire, which are constructed and united as follows: The felloes are made of cast iron ribbed for strength, with swells in the ribs to receive the spokes and bolts. The spokes do not meet the felloes at their joints, but the ends of the felloes are grooved in lines radiating from the centre of the wheel, in such a manner as when the joints are closed, to form a bolt hole through the felloes at each joint. The tire is then put on, and bolts are passed entirely through the tire and the joints of the felloes and secured by nuts. Thus the joints are made and the tire secured by the same bolts.

A wrought iron car-wheel has been patented; the improvement in which consists in the mode of connecting the rim with the inner part of the wheel. The spokes are connected at their outer ends by a band constituting a light rim. This is dovetailed in its cross sections. The principal rim, or tire, is of sufficient strength, with a groove in its interior, to receive the narrow dovetailed rim, which groove is spread sufficiently to receive it without depending

entirely upon expansion in heating. After heating this tire, the rim is inserted and the tire is powerfully forced upon the rim by pressure on the tread as well as upon its sides. Thus the dovetailed joint is formed and tightened without the use of soft fused metal, which gives great strength and durability to the wheel.

Several patents have been granted for alleged improvements in cast iron disc car-wheels. Wheels of cast iron, must, of course, possess the proper forms for wheels, and these forms render it difficult to cast the rim, and chill it, in connection with the rest of the wheel; the unequal contraction causing fracture, or a degree of strain which often renders the wheel useless. Various modifications of form have been adopted to obviate this difficulty with some success, but the world does not yet extend to cast iron wheels their entire confidence. The beneficial results which have followed several apparently unimportant changes of form, have induced this office to be liberal in granting patents for them, in hope that the desired end might finally be attained by means at first appearing unpromising, if not unphilosophical. Wheels with concavo, convex, corrugated and mixed discs, have formerly been patented; some of these being with, and some without spokes, or flanges. It is not necessary to give a detailed description of the precise forms of the wheels patented this year, especially as they are generally but modifications, or combinations of forms already known, and cannot be proved, except by experiment, to be better than the wheels now in use; and I am not aware that such fact has yet been thus established. It may not be amiss, however, to state that one of the cast iron wheels patented this year is composed entirely of tubes opening into each other by trumpet mouths; by which the inventor expects to attain the requisite compensation for contraction in cooling. This wheel differs more in form from those well known, but its advantages must be tested by experiment. There is no merit in a mere change of form, without an improved result, and in ordinary cases, it is an established principle of patent law, that such changes are not the subjects of letters patent, unless the claim to real improvement is at least plausible. But upon applications for patents upon such subjects as the above, this office should be liberal, as great injustice might otherwise be done, from the impossibility of judging *apriori* of the advantages of form. In these wheels, form is every thing that could be patented, and if the desired result can be attained, the successful competitor will richly merit his reward.

Several patents have been granted for improvements in hubs and axles, or their adaptation to and mode of connection with each other. Every improvement which increases safety, or security in this part of vehicles, is of much importance, as upon them safety to life and property more especially depends. As prompt action is also necessary, much is saved by easy modes of removing and re-adjusting the wheels. Letters patent have been granted for a mode of connecting the hub to the axle, where, by the act of raising the axle with the jack, the wheel is released and ready to be removed, and when replaced, and the jack removed, the wheel is again firmly held. This is effected by a spring catch working in a groove in the inner end of the hub, which holds the wheel to its place. From this catch a pin extends down through the axle which rests upon the jack when the axle is raised, and the weight of the vehicle forces up the catch, or releases the hub. Another patent mode of holding the hub upon the axle is as follows: A rod having a hook at one end is laid in a groove upon the top of that part of the axle which enters the hub; so that when the hub is in place the hook end of the rod projects

beyond the washer or shoulder, against which the washer usually rests. The other end of the rod extends beyond the inner end of the hub, and is there bent up, forming a kind of handle. When it is desired to release the wheel, the rod is turned up by this handle, and the hook at the other end moves round and comes directly over the end of the axle, opposing no obstacle to the removal of the wheel. When it is desired to hold the wheel in place, the rod is turned in the other direction, and the hook extends out over the end of the shoulder, at the outer end of the hub, and prevents it from being removed. The outer end of the hub may be closed.

In another improvement, the oil box is connected by springs to the upper part of the box, in such manner as to rise as the soft metal of the box wears, thereby keeping the joints tight, and indicating the wear of the soft metal, or other substance, against which the axle bears. Letters patent have also been granted for an improvement in oil boxes, consisting principally in the arrangement of partitions for the better application of the oil, and disposition of the waste. One of the improvements patented, consist principally in making that part of the axle hollow, which enters the hub, and placing friction wheels within this cavity, upon an axis of its own, which lies a little below the centre of the principal axis. This arrangement it is said, will insure easy running of the wheel, and when the carriage is running upon the horses, the part of the axle which has no anti-friction surface, will press against the boxes, and by creating friction, operate as a brake, and resists the motion of the carriage at the most convenient and advantageous point.

I will simply mention one other patented mode of connecting wheels with axles. It consists of a groove in the axle, into which a sliding spring plate works, which is connected with the hub in such manner as to spring into its place, when the wheel is brought up to its place. When the plate comes into the groove, in position to hold the wheel, a horizontal spring pin, which retires as the plate rises into place, drops into a perforation in the plate, and holds it firmly, so that it cannot be disturbed by such shocks as the vehicle is subject to.

Several brakes for carriages have been patented this year, some of which I will briefly notice. One of these improvements is in the apparatus to hold the block of wood which operates against the wheel. These blocks are liable to wear and become useless, while the holder remains uninjured, and much trouble and damage to the parts are necessary in removing the block, and substituting another. To obviate this, the patentee places the block in a clamp, connected with the arm of the brake, which clamp, has a hinged jaw; and holding these jaws together by screw bolts passing immediately above and below the block, and bracing the upper and lower ends of the block, so that it will not slip out between the bolts. With this arrangement the wooden rubber can be removed, and another substituted almost as easily and conveniently as if they were merely held in a vice. Another patentee connects the brake to the truck frame by a link. This link at each end passes through a box, which is lined with India rubber, making it tight. The elasticity of the India rubber is sufficient to raise the brake from the wheel when not in use, and when it is brought down upon the wheel, the India rubber yields all that is necessary, thus preventing all friction, noise and wear of the parts which would otherwise be disagreeable and injurious.

Another patent which I will notice, is for an ingenious arrangement of levers and connecting rods with brakes for eight wheel cars, whereby the force applied by the brakesman to one set of wheels, re-acts upon the brakes of the other sets; so that each set receives the power applied, as forcibly as if the other were not used, and nearly the same force is applied. Arrangements having a somewhat similar effect, have heretofore been made; but one excellence of that under consideration, is that they can be with the utmost ease applied to the brakes most commonly in use, without alteration. Two levers are placed between the trucks and their centres united by a rod, and with these directly or indirectly, all the others are united. Further remarks upon brakes or other matters connected with the subject of land conveyance are deemed unnecessary. I will now proceed to the consideration of another class.

HYDRAULICS AND PNEUMATICS.

In this class thirty four patents have been granted, extending to some ten varieties of sub-divisions. A large number of applications belonging to this class are annually made, but all its branches have so long been the subject of investigation throughout the civilized world, that it is difficult to produce any thing essentially new, which is of an interesting or useful character.

Two patents have been granted for improvements in windmills. They present slight novelty, but seem to be no more useful than those in common use. Both wheels revolve upon vertical axes; and there are novelties in the mode of regulating the vanes.

Two filters have been patented. The one consists of a series of boxes filled with proper filtering materials. The water passes through these in succession, always passing upwards, with arrangements for throwing each section occasionally out of action for cleansing, without interrupting the operation. The other is a filtering faucet, so constructed that the water may pass through the filtering medium successively in opposite directions at the pleasure of the user, for the purpose of cleansing; or the water can be drawn directly, without passing through the filtering medium.

Two blowers have been patented. The one is a slight modification of those blowers which consist of spiral arms inclosed in a cylinder, working in a reservoir of water. The other is a kind of compound bellows, having four apartments, the two outer ones communicating directly with the tube, the air being received through the centre partition, and discharged alternately on opposite sides thereof. Alternating motions are given to the bellows through a rod connected with the same partition, whereby a constant current of air is produced.

Two patents have been granted for improvements in the water ram. In one of these the water is conducted to the chamber by small tubes firmly connected, for the purpose it is said, of preventing shocks, and too great a recession of water. The other for an improvement in the waste valve and appurtenance, for the purpose of making it close more suddenly after the pressure has become sufficient.

A patent has also been granted for a valve of water mains. It possesses some novelty, and is cheap and efficient, and easily repaired. A regulator for water wheels has also been patented, whereby the discharge of water from the wheel is regulated to govern its speed. An improper degree of speed is, by a common regulator, made to change the band on cone-pulleys, and this produces a differential motion in gearing, which operates to expand, or contract the discharge.

No less than six patents have been granted for improvements in raising and transferring water in buckets out of wells. A remarkable degree of inventive

genius seems suddenly to have been called into action upon this subject. All these patents have been granted for slight improvements in modes known for centuries. They comprise the means of tilting the buckets, changing the direction of their motions, carrying the water to points somewhat distant after it is raised, &c. A detailed account of them is not necessary, they can be sufficiently well understood if desired, by perusal of the claims.

Eight patents have been granted for improvements in pumps for raising water. One of these is a rotary pump, in which the floats work upon a vertical shaft; each float has its lower part united to the upper, by journals at their ends, in such manner that the pressure of the water will keep the flapping under parts in an upright position, but when they meet with stones or other hard obstruction, they will revolve on their journals and pass over without breaking. In another of these pumps, the casing is an inverted conical frustum, having an inclined way arranged from end to end, and as the floats revolve, the water ascends these inclines to its point of exit.

Another of these rotary pumps is constructed as follows:—The casing is cylindrical with induction and eduction openings; between these openings there is a recess, within which a stop plays. This stop at its inner end is connected with a cylinder of equal length with the interior of the casing, but of less diameter. This inner cylinder is placed upon an eccentric shaft, in such manner that its outer periphery shall at one side touch the casing; as this shaft revolves, the cylinder constantly changes its line of contact with the casings, causing the water behind it to rise, and forcing out that which is before; the stop in the meantime sliding in and out according to the eccentricity of the shaft. A band of India rubber around the cylinder will keep the joints tight, and it will be perceived that the cylinder or piston does not revolve, but is constantly pressed against the casing, scarcely rubbing at all. The pump appears to work admirably.

Another pump which is reciprocating, has its spout so connected with the cylinder that it can be turned so as to discharge on either side. A pump has also been patented whose piston chamber is trumpet mouthed above the point where the piston usually plays. The lower valve is a ball resting in a proper seat, and connected to the piston by a chain of such length as not to be disturbed by the ordinary motions of the piston; but when the piston is raised above the trumpet mouth of the chamber, it also raises the lower valve, so that any water in the body of the pump will fall to the bottom. There are two or three other pumps of sufficient interest to receive notice; but it would be very difficult to give an intelligible description of them without drawings, and they are therefore passed over.

A few patents have been granted this year for improvements in water wheels. Two of these are for tide wheels, one of which is too complicated for a particular description without drawings. It has gates and casings so arranged as to cause the water to descend upon the wheel in the proper direction, whether from one side or the other, and is connected with a regulating apparatus for the supply of the water. The other is placed upon a shaft which is inclined by being eccentrically connected above to a revolving platform whose centre is directly over the stop in which the shaft rests. In this position, it will be perceived that the paddles of only one side of the wheel can dip at the same time, and on which side this shall take place, is readily regulated by revolving the platform.

Letters patent have also been granted for an improvement upon reaction wheels, by which their motion can be readily reversed; and another for a wa-

ter wheel in the form of a conch shell. There is another wheel which I would like to notice for its singularity, but it would be utterly unintelligible without drawings. I regret the less being unable to notice it, as it appears more ingenious than useful. There is nothing further in the class of hydraulics and pneumatics which requires particular notice in this place, and I will therefore dismiss the subject and hasten to the next.

LUMBER.

About ninety patents have been granted within the year, belonging to this comprehensive and diversified class. It has ten subdivisions, many of which might well be again subdivided, besides numerous miscellaneous matters. Much of the machinery of this class is very complicated. I shall proceed to view the various patents belonging to it, as concisely as possible, under the various subdivisions.

Saw Mills.—Some ten patents have been granted this year, belonging to this variety of machinery. Among these is one for sawing wood. The log is placed upon the arms of a revolving feed cylinder, and is raised to the saw. When the sawing of this is completed, another is brought to the saw upon other arms, while the cylinder continues to revolve. Another is for sawing mitres, which is effected by causing circular saws to move towards each other while the board is passing. The motion is governed by guides and regulators to give the desired angle to the kerfs.

An improvement in barrel saws has also been patented. This saw is made in sections, for greater stiffness; the carriage travels upon adjustable inclined ways, in order to carry the block slightly away from the saw as it receives the cut, and a guide travels with the stave as it is cut, within the saw for the purpose of drawing it away from the saw. The object is to avoid contact between the saw and the timber, except at the point where the work is done.

Three patents have been granted for improved machines for curvilinear sawing. One is for a mode of regulating the warp of the kerf, especially for ship timber; the log is to be turned in accordance with the gauge, as the sawing progresses, and the turning of the saw is effected by levers acting with swivels. Another of these mills provides a revolving adjustable platform, which may be elevated and depressed, in order to keep the parts of the log equally above and below the centre of rotation, as the work progresses, and the log is turned. This, it is alleged, will tend to prevent bending and breaking the saw. Another of these mills has arrangements for turning the saw by force applied to the swivels in connection with the saw, near the part where it operates upon the log. The parts are grooved together in such a manner as to act with uniformity, and prevent strain and twisting of the saw.

Some half dozen shingle machines have been patented within the year, but differ so little from such as have been known, that the difference, though patentable, could not interest when pointed out in a cursory manner. One of them, however, I will notice, which is more out of the common course. It is a revolving disc machine, not easily understood, even with drawings, but it effects the cutting, planing and joining of a shingle at each revolution.

Fences and Gates.—Seven or eight patents have been granted in this division of the subject. One of those patented, is a gate for a flood fence. It is made to slide up and down in grooves of posts, and has a float attached at the bottom, of sufficient buoyancy to elevate it as the flood rises, and the weight is sufficient to depress it, after the flood has subsided. Another of

these gates folds up when opened, after the manner of "lazy tongs," within a compass equal to the width of the slats; in opening and closing, it slides upon ways. Another folds upwards, so that the slats which, when it is closed are horizontal, become vertical when open and in juxtaposition with each other. A very simple fence is among the patented, made by winding a wire at points near the tops and bottoms of the palings, around each paling, and carrying the wire on to each in succession, and winding around pins in the posts for support, the palings having shoulders above the lower wire, and below the upper one, to keep them in a vertical position.

Two patents have been granted for machines for cutting veneers. The one cuts them from flat surfaces of wood, and the other in continuous sheets around the convex surface of a cylinder. Both these modes of cutting are well known, and the machines are but improvements upon those formerly used; but it would be impossible without drawings to give a clear idea of the improvements.

Letters patent have also been granted for an improved mode of glueing veneers. The caul, almost universally used, is made of wood, or other hard material, in the reverse form of the surface to be veneered, and a different one is necessarily resorted to for each different surface. The patentee, in the case under consideration, uses a plain caul with a thick facing of India rubber, which is said to adapt itself in a practical manner to almost all surfaces in succession.

Letters patent have been granted for several treenail machines, bench hooks and machines for cutting felloes. A machine for splitting and dressing rattans. A machine for making brooms; some of which could not be rendered intelligible in this place, and others it is not necessary to describe. A very pretty invention has been patented for bending timber, in which pressure is applied to the ends, as well as to the sides. It is said to work admirably, and to obviate most of the difficulties which have heretofore been encountered.

Turning.—About twelve patents have been granted for improvements in lathes, turning irregular forms, cutting wooden screws, &c. Two of these are for turning right and left hand lasts at one operation. Two for improvements in gearing for lathes. Another of these patents is for a machine which turns the toes and heels of the lasts perfectly, and presents a new mode of varying the relative portions of the pattern and the last, or other irregular form turned. In two of the machines mentioned, inverted patterns are used. Two slight improvements have been patented in turning screws on bedstead rails. A machine has been patented for dressing irregular forms, in which the cutters travel lengthwise of the block and patterns, they having an intermediate revolution to adapt them to the motion of the cutters. The foregoing machines for turning, &c., are generally too complicated to justify an attempt to present them in detail, without drawings. However useful they may be, they present very little novelty.

About twelve patents have been granted for boring and mortising machines, most of them of a miscellaneous character; such as boring out bungs for casks, boring spools or bobbins, &c. Two of these patents are for boring hubs, to prepare them for the reception of boxes. Both of these machines present improved modes of holding the cutter, and one of them has an improved apparatus for feeding the cutter forward, to compensate for great resistances. One of these machines is for boring ship timber. The auger is carried forward as the boring proceeds, by a rack and pinion, and whenever it is necessary to clear, an auxiliary pinion is thrown into gear and reverses

the motion. The novelty is in the manner of producing the motions; the same motions being previously effected by machinery. Letters patent have been granted for two or three other mortising machines. One of these produces the mortise by an endless chain of cutters.

Barrel Machinery.—Several patents have been granted within the year for improvements in machines for performing the various operations necessary in the construction of barrels, &c. Four of these are for jointing staves. In one, the stave is jointed by being held on a platform, which vibrates in such manner as to convey the end of the stave towards the cutter or plane, as it advances. The plane used is a double one, with cutters set in such a manner that each cuts its appropriate end of the stave. The radius of vibration of the platform is adjustable for different sizes of casks, and the vibrations are effected by inclined surfaces. In another, the cutters are attached to a horizontal disc, made dishing, and the stave is held in a swinging frame outside of the circumference of the cutter disc. The stave is not bent, but the dishing form of the cutter disc, corresponding with the knives, produces the proper variety of width. In another of these, a double plane is used, like the one just above mentioned, except that the stock is jointed between the cutters; and the requisite angle can be given to the stock to dress both ends of the stave to its required width. Two or three patents have been granted for machinery for planing staves. They have rotary cutters, shaped of course to the form of the stave, with devices for forcing the stave between. These machines have the general character of planing machines, and to point out the nice distinctions between them, would require drawings, and more time than I can devote.

Planing Machines.—The immense importance of this variety of machinery, and the present condition of the planing business, have called into action a vast amount of inventive genius, and directed it with incredible zeal and energy to this department. Above twenty patents have been granted for improvements in planing, and many applications have been rejected. When the true character of machinery for planing is considered, when its simplicity is recollected, and the vast efforts which have for a long time been constantly made to improve and modify this branch of machinery, it will scarcely be believed that all the patents granted this year cover real improvements, in the popular sense of that term, but it will be obvious that many of them are *improvements* only in its legal meaning, to wit: such modifications as are patentable, whether better or worse, than what was previously known. Some of the machines above mentioned appear to have answered a good practical purpose, and the same fact may ultimately be developed in relation to others. It is unnecessary to advise the public particularly in relation to machines which are useless, and it is notorious that all, or nearly all, which are reduced to successful practice, immediately become the subject of litigation, and from that source derive sufficient publicity.

Few, if any, of those to whom patents have been granted this year, have used the convex or cylindrical cutter; but the improvements which have been patented are applied to disc, stationary and reciprocating planes. In all these varieties of machines, improvements have been made which appear to render them successful. Some of them have long been an obsolete idea for planing boards, though some of them have long been known to be useful for planing timber, and for some other purposes. Some experiments have been made with the above mentioned machines, which appear to have proved eminently successful; but whether in course of time they will be found to excel, or suc-

cessfully compete with those which have heretofore been most popular, it is at present, perhaps, impossible to determine.

I am not aware that further remarks upon the subject of planing machines are necessary; the nice distinctions between pre-existing machines and the improvements upon them which have been patented, would lead me beyond appropriate limits.

Having disposed of the inventions in machinery for working in lumber, I now come to my last class.

FIBROUS AND TEXTILE MANUFACTURES AND MACHINERY.

About ninety patents have been granted this year for improvements comprehended in this class. Machinery for the manufacture of fibrous and textile fabrics, is more complicated and multifarious than that of any other class, and the vast number of improvements already made and published in the books, used in the factories without publication, and to be found in the archives of this office, and elsewhere, render the field of investigation almost boundless, and the number of improvements of which it is susceptible, will continue to expand its limits with increasing rapidity. The subject is inexhaustible, and each new discovery but prepares the way for others still more subtle and refined. I will commence the review of this class with machinery connected with the preparation of the various kinds of fibres used in this branch of manufactures.

Two or three patents have been granted for improvements in wool-pickers, or burring machines. One of these is for an improvement in burring cylinders. The patentee winds narrow strips of sheet metal, at short distances apart, around a cylinder; one edge of these strips being placed in grooves in the surface thereof. Hooks are formed in each alternate ring, and the intermediate rings are left without teeth. This arrangement, it is contended, gives a better opportunity for saving the fibres, and more effectually excludes the burrs and other substances which are to be beaten off while the fibres are held.

A mode or process of constructing burring and other toothed cylinders has been patented. It is as follows:—A thin threaded screw, of the size required for the cylinder, has wound around it a covering of thick paper, or pasteboard. The spaces between the threads would thus form a spiral tube. Through the paste-board, and into these grooves, teeth are inserted, so that their ends will rest upon the bottoms of the grooves. The screw, it will be perceived, thus guides in inserting the teeth. The screw is then taken out by turning it, the ends of the teeth forming the thread of a female screw. A cylinder is then inserted in the place of the screw, and fused metal is poured in between this cylinder and the paste-board, and allowed to cool. The pasteboard is then removed, leaving the teeth properly set.

Five or six patents have been granted for hemp-brakes and scutchers. In one of these the hemp passes from the feeding apron to pressing rollers, grooved around their circumference, thence between beaters or knives, both sets of which strike the hemp, and while the hemp is held between the beaters, and also between the grooved rollers, scrapers on both sides come upon it with a compound sliding and crank motion, which causes them to move nearly in a flat eclipse, and thus keeps them long in contact with the hemp between. In another of these machines, the hemp passes first between smooth weighted rollers, then between rollers grooved lengthwise, and thence between

beaters, both of which move; the beaters having sets of small rollers, or cleaners, revolving between them to carry the hemp forward, and prevent it from hanging between the beaters.

One of the scutchers patented has a large disc, to the face of which the swords are attached in a position tangential to a large hub, or head; the swords being inclined to the face of the disc in an angle of thirty or forty degrees. A rest of course is provided to support the hemp during the operation. The foregoing machines are all said to work admirably.

Four or five cotton gins have been patented this year. One of them has an auxiliary grate placed in a position nearly horizontal behind the common grate, and bent in such manner that the teeth of the saws pass twice through. Immediately back of the point where the saws pass the second time through the auxiliary grate, there is a revolving brush to remove the dust and impurities which are deposited. In another of these gins the ordinary grate is dispensed with, and a screw roller is substituted, of such form as would be produced by winding wire around a cylinder, the coils touching each other. The saw teeth are such as would be produced by making incisions with the edge of a flat file into the edges of a circular plate, leaving the spaces between untouched. By this machine the bolls are kept moving from one side of the gin towards the other, coming successively in contact with different teeth until the cotton is entirely stript off, and the seed falls out at the end of the machine. Two patents have been granted for roller-gins, but I could not make them intelligible without drawings.

Six or seven patents have been granted for improvements in carding machines. In one of these, the workers and clearers are driven directly by a band from the shaft of the main cylinder. The other has reference to a mode of stripping the cards. Instead of using the well known flat top cards, cylinder cards are substituted for them. The cylinders have not the usual motion of top cylinders, but they are intended to be almost stationary for the main cylinder to work against, and to carry off the impurities. Upon these cylinders there is a frame containing one stripper for each, and as they revolve very slowly, they are stripped by the vibrating motion thereof.

Sewing Machines.—Machines of this kind, until within a few years, have attracted but little attention; but as they are coming into use, and are found to answer an excellent purpose, the inventor is ingeniously exercising his skill to improve them. No less than five patents have been granted this year for sewing machines. One of these is a re-issue of a patent granted some years ago, and need not be noticed. Two of the others are much alike, differing only in minor particulars. The cloth in each with its edge properly presented to the needle, is secured to a proper feeding apparatus. The needle is placed perpendicular to the cloth in a frame sliding back and forth for inserting and withdrawing it; the eye is near the point. On the opposite side of the cloth is a twisted hook which slides endwise in a direction nearly perpendicular to the needle; as the needle passes through, the thread is caught by the hook and drawn sidewise, forming a loop. When the needle again passes through the cloth, it passes through this loop also, and the hook moves forward releasing the old loop, and seizing the new thread, forms a new loop passing through the old one. This operation combined produces what is well known as the Tambour stitch.

In another of these machines, the thread is carried through the cloth by a bent needle, with the eye near the point. The shape of the needle leaves a space between it and the thread. A shuttle upon a circular way on the side

of the cloth opposite the needle has in it a bobbin of thread. This shuttle is sharp pointed and curved to adapt it to the way, and as it moves around it passes through the opening between the needle and the thread, and the needle is then withdrawn, leaving a loop of its own thread around the thread of the bobbin. This, if continued, will produce a seam. The shuttle is driven by two arms from the centre shaft with pins in their ends taking into perforations one in each end of the shuttle, and whenever one of these pins approaches the thread of the needle it is raised out of the way, and the shuttle is driven by the other. There are other ingenious devices connected with the machines which I would gladly describe, but I am unable to devote further time to them.

Six or eight patents have been granted for improvements in machines for making cordage. One of these is for an ingenious, but rather complicated apparatus for regulating the tension of the yarns. It could not be made intelligible in this place. Two of the others are intended for making ropes from cotton. The improvements in the nipper, by which, as the strands pass through them, any impurities which may stick to the sides of the strand are removed and thrown out, and in placing in the forming tube at the point where the strands meet and commence laying, a block, or plate, having a perforation equal to the size of the rope. This block being able to move laterally to accommodate irregularity of strain. The springs which press together the jaws of the nippers have also been improved. In another of these machines the strands are conducted as near to the laying point as possible; each in a direction tangential to an imaginary core of the rope as nearly as possible in the direction in which the strand is to be laid.

In the last I will notice of these machines several sets of bobbins are arranged about their respective spindles. The threads pass through perforations in a flanch, firmly connected with this spindle; thence they all pass through a single opening in the top of the spindle. The threads or yarns from the bobbins arranged around each spindle and form a strand. These strands are guided up to the top of the main shaft, when they pass through their respective openings in said shaft to the nippers. The whole receive a sun and planet motion, producing on all parts the proper twist; and the cord is drawn off in the usual manner. The spindles receive their motions from the interior of a fixed ring against which pullies, or wheels, on the bottom of the spindles work; the motion being produced by friction. The upper side of the fixed ring is bevelled, and the lower edges of the spindle pullies are bevelled also, and these last are susceptible of adjustment towards, or from the main shaft. This construction and adjustment enables the operator to adjust the relative speeds of the various parts at pleasure, and secures great steadiness of motion.

A very interesting lapping machine has been patented this year, whose details cannot easily be presented without drawings. It has guides so arranged that whether the number of laps is greater or less, each at once assumes its appropriate position upon the roller. Two very ingenious machines have been patented for twisting the fringe of shawls. They are totally different from each other, but both seem calculated to perform their duty very perfectly and with great expedition.

Two machines have been patented for making weavers' heddles; the one of wire, and the other of thread. The one draws the wire into the machine, cuts off the proper length, doubles it in the proper manner, while the twist is given to it, which completes the heddle.

The other is a kind of loom, using shuttles. It is quite complicated, as may easily be supposed from the duty it performs, and difficult even to understand with drawings. It seems effectually to perform its work.

Spinning.—Some fifteen or twenty patents have been granted this year, for improvements in machinery for spinning. Two of these are for improvements in the self action of mules, and self acting jack spinners, of which it is of course useless to attempt an intelligible description without drawings. Another is for a machine for producing yarn of the same kind as that spun on the mule, retaining the spindles always in the same relative position to the draw rollers. This is said to be accomplished, and perhaps it may be so, however incredible it may appear. A new mode of gearing drawing heads, has also been patented. An improved flier has been patented, whose arms in their whole length are thin hollow tubes, made of steel, and said to answer well, and to be a great improvement. An improved apparatus has been patented for spinning rope yarn, in which the flier has heavy discs at both ends, and in which the drag is produced, and regulated by a forked bar or spring pressing on a washer, resting on a shoulder upon the spindle, the fork embracing the spindle and the pressure being adjusted by a set screw, thus producing the necessary drag by pressing the spindle down evenly into its cup. This arrangement is said to produce a steadiness and efficiency heretofore unknown in this department of spinning.

In some spinning machines, the bobbin rests its weight directly upon the circumference of a wheel. The wheel has such a position as to drive the bobbin when in motion. It has been found however, that when driven in this manner, the bobbin is by little irregularities frequently thrown up, producing much mischief, in a process so delicate as spinning. To prevent this, a collar has been interposed between the bobbin and the wheel, which drives it. This collar is held down by a collar over the spindle. By this arrangement these injurious irregularities are prevented from extending themselves to the bobbin. An improvement in spindles has also been patented to foreigners; but this improvement has been published in the English journals, and need not therefore, be described.

Looms.—About thirty patents have been granted this year for improvements in looms for weaving. Seven or eight of which however, are re-issues, and have been previously noticed. Machinery of this kind is generally so complicated as to render futile any attempt to describe them without drawings, or within such limits as would be justifiable in this report. Some of the improvements however, I will notice; for the rest, I must necessarily refer to the records of this office, or to the patents themselves.

Some years since, patents were granted for two or more looms, in which the shuttle-boxes were worked by a wheel, with two rows of pins in its disc, through the medium of chains, hooks, weights, &c., which machinery was rather complicated. Within the year, a patent has been granted for a loom, in which the pin wheel is used for the same purpose, but by very different and simple means. The spear or rod which moves the shuttle-boxes, has a shoe affixed to its lower end, with several inclined planes of different lengths. The pins in the wheels are also of different lengths, and their position is changed at pleasure; certain of the pins only will reach the different inclines. These pins by working directly against the inclines on the shoe, elevate the boxes. They will of course fall when relieved by their own weight. They may be worked for different patterns by merely changing the pins. This arrangement raises the boxes only the space of one box at a time. A subsequent patentee

arranges several rows of pins on the pin wheel in lines, at once concentric with the wheel and radiating from the centre. He uses a single shoe, and the pins are all of the same length; the lower side of the shoe is an inclined plane. As the wheel revolves, the pins striking against the incline of the shoe, will raise the shuttle boxes. By this arrangement the boxes may be so operated, that the highest and the lowest, or any other two may be used in succession. This will answer for an ordinary number of boxes; but would probably fail if six or eight shuttle-boxes should be used. Another patent has been granted for a loom, having the pin wheel with one row of pins of different lengths, which is capable of greater compass. It is however much more complicated.

Letters patent have been granted for a loom for weaving pile fabrics, which has an auxiliary lay, for the purpose of forcing up the wires before the regular beats. The two lays are so arranged as to operate in concert; the action of the one being governed by the other. In another patented loom for weaving coach lace, the figuring wires are drawn out, and inserted by rollers, acting on them like feed rollers, and at intervals the motions requisite for carrying the wire forward and returning to withdraw another. On one of these looms there are two whip rolls, to compensate for the irregularity of the take-up in figuring.

A very ingenious loom for weaving figured fabrics has been patented, which I should be glad to describe, but it could not be made intelligible. I will merely remark that an important feature of it is that the motions are all positive, and the use of cords is dispensed with; thus avoiding the irregularities consequent upon shrinkage and expansion.

In the last loom I shall mention, the figuring cylinder is placed directly below the harness, which is sustained by rigid frames; points project down from these harness frames to fit perforations in the cylinder. The cylinder may be perforated in such manner that several figures may be woven from it. At each beat of the lay, the cylinder is turned and raised. That part of the harness will be raised, the points on whose frames do not find perforations in the cylinder. If several figures are formed on the cylinder, they must be two or more intervals apart; and there is an adjustment of the apparatus for turning the cylinder accordingly. I may add that in this loom one cylinder may be substituted for another at pleasure.

A large proportion of the inventions patented in this class are real and valuable, and this remark applies, perhaps, more justly to this class than to any other. But the complicated character of the machinery renders it impossible to give, in the form of an annual report, a fair idea of what has actually been done.

I will here close, and submit the foregoing to your consideration. Your knowledge of the arts will satisfy you that it is impossible in the few days allotted to me, to do justice to the inventive genius of this country. I am happy to believe that your own pen has supplied the deficiency in a manner which can leave nothing to be regretted.

Respectfully submitted by

W. P. N. FITZGERALD,

Examiner of Patents.

To Hon. THOMAS EWBANK,

Commissioner of Patents.

Honorable THOMAS EWBANK,

Commissioner of Patents.

SIR:—In conformity with the practice of this office and upon your request, I have the honor herewith to submit a report of the condition of the business entrusted to my charge during the past year, and also a succinct notice of some of the inventions in the various classes of art of which the examination is allotted to me.

At the commencement of the present year there remained upon my desk unacted upon 117 cases, and in addition to these some 20 were transferred to me by one of my colleagues during the year, in order to equalize the amount of business before us; and during the year 502 new cases have in their usual routine been submitted to me for examination, making an aggregate of 639 cases. Of these, 266 applications have been patented and 373 rejected; but as many of these cases have been again submitted to the office with amended claims, and afterwards either patented or again rejected—thus making two and sometimes three reports on one case, the whole number of formal rejections would be swelled to 421—and the number of actual decisions made by me during the year amount to 687.

In many cases it is necessary to return papers for amendment of the claims, accompanied by the reasons of the office for such requisition. It is also often requisite to send back papers for corrections of the description, drawings or oath, or to enable the parties to account for and remedy want of correspondence between the various papers themselves, or between some of them and the model. In any of these instances a careful perusal of the papers and inspection of the drawing and model is indispensable, and written instructions are made out and forwarded to the applicants. If such proceedings as these be taken into account, the whole number of actions upon applications would amount to about 1,226, and it is but justice to state that my assistant has in addition to performing this last class of duties, which in the routine of the office comes under his charge, aided me in the searches requisite to determine upon the novelty of claims. A comparison of these numbers would show the fact, which it is proper to state in terms, that there are at present no cases before me to be acted upon, but this state of business will probably be changed before the close of the day. When the researches necessary not only in the archives of this office, but also in scientific works, and likewise the numerous nice points to be decided upon after such researches are made, are considered by you—it must be evident that such an amount of labor could only be performed under a strong desire to free the office from the accumulation of business that has long been heaped upon it, and it is evident, that although such an exertion has been persevered in for the year, as it were under the spur, still it is equally certain that such a forced action of the mind can hardly be expected to endure, and if the business of this office increases at its customary rate, it will be almost an impossibility not to go behindhand during the ensuing twelve months.

In the *Class of Metallurgy*, which comprehends not only improvements in the manufacture of the metals themselves, but also machines for working them into shape, and likewise many articles manufactured of metals, nearly one hundred patents have been granted. In a brief description of some of these inventions these divisions will, as far as possible, be preserved, and

those machines which relate to the preparation of the ore will naturally first present themselves. Under the name of *Gold Washers or Ore Separators* many such machines have been brought before this office, some of them presenting much more novelty and characterised by greater invention than is usually the case, being in fact new methods of applying physical principles heretofore unemployed in this branch of art.

The discovery of the California gold region and the cession of that country to the United States has given a strong impulse to invention in this species of machines, and some of them are characterised not only by perfect adaptation to their destined use, but also by a refined simplicity and lightness of construction; the latter points having been forced upon the inventors by the length of the route to this new Eldorado, and the difficulty attending their transportation even after their arrival on the coast of California.

These machines are only applicable when the metal exists as such, and in mere mechanical mixture with other substances, and are of no use as far as ores proper or chemical combinations of metals with other elements are concerned.

The simplest of these machines, and one of the action of which, report speaks highly, consists merely of a hollow cone of tin or sheet metal, having a spindle attached to and passing through its apex, and upon its inner side a ledge or shelf of sheet metal fastened, in the shape of the thread of a nut or female screw. The cone is placed with its apex downwards, in such a manner that it can be revolved upon the above mentioned spindle, and the ore and water are thrown into the cavity. If the machine be now shaken a few times these will be intimately mixed, and when a whirling motion is given to it the particles of sand and metal will be thrown by centrifugal force towards the exterior of the cone, but the lighter particles will be near the surface, the heavier ones farther down in the body of the machine.

As a current of water is continually introduced, the former will pass out over the edge of the cone-shaped bowl, and the latter will strike against its sides between the different parts of the before mentioned ledge, and be screwed down into the bottom of the machines, thence to be removed at will, when a sufficient quantity has been accumulated.

A machine depending for its action, as this does, upon centrifugal force and the different specific gravities of the materials to be acted upon, has likewise been patented; it consists of two hollow cones, both revolving, and one within the other; as the particles pass over the edge of the inner cone they are received into the outer one and washed again; but this machine is wanting in the apparatus for forcing the heavy particles to the bottom, and although from its double action it appears calculated to produce a better effect, still it is believed that it will, although efficient, not produce as good results as its more simple competitor.

A modification of the first described machine has also been patented; it has several of the screw shaped ledges, arranged as a many threaded screw, and these are in certain places cut entirely away, thus affording an opportunity to any light particles that may have been caught in the thread, to rise and pass over the edge of the bowl, instead of being forced down with the metal, to the bottom of the same.

Another contrivance has been patented, consisting of three vessels, all open at the top, and placed concentrically, the one within the other. The outside one has a bottom, and is placed with its upper edge below that of the intermediate vessel, the top of which is also lower than that of the inmost vessel or tube. This latter extends nearly to the bottom of the first, which is shaped like an inverted cone, and the intermediate vessel or tube extends downwards to the base of this cone. A current of water is passed down through the inner tube, and flows thence into the cone-shaped bottom and ascends, and thence passes out over the edge of the outer vessel, through the ring-shaped space between it and the intermediate vessel. The ore is introduced between the inmost vessel and the centre one, falls through the still water contained in the former, and is met by the ascending current before described, which carries the light particles away with it, while the heavier ones fall into the apex of the cone-shaped bottom. In another machine, also depending upon difference in specific gravity and currents of water for its action; a tube, wide-mouthed at one and closed at the other end, is immersed in a stream of water with its mouth towards the descending current; a number of apertures are made in the upper side of this tube, near its lowest end, with adjutages something in shape like the slats of a venitian blind, through which the water rises at an angle of 45 degrees with the horizon, slanting in the same direction as the current; these slats extend through the bottom of, and into a semi-cylindrical vessel, lying horizontal, and likewise closed on the down stream end. Upon a platform attached to this end, the materials to be washed are deposited. The current rising through the slats, strikes this end, stirs up and carries with it a portion of the ore, and is deflected by the end in a reverse current over the upward slanting currents before noticed. The heavy particles fall through the slats into the first named tube, and the lighter ones are borne off by the deflected upward current. It is evident that the heavy particles while falling through the slanting currents, must be continually forced towards the back or down stream and closed end of the machine, and it is thus hardly possible that any metallic particles can escape. The slanting currents acting in connexion with the superior horizontal currents, are the novel features in this machine. Many other contrivances for the same purposes have been patented, and are chiefly modifications of the rockers, shaking or stationary inclined tables, and revolving screens, now in ordinary use for separating metals from the foreign matter that is found deposited with them.

A patent has been granted for an improvement in puddling furnaces, which consists in the application of a species of ash trap between the fire grate and the working bottom of the furnaces, the products of combustion are forced to traverse this passage, and a great portion of the ashes, fine coal, etc., mingled with them are caught there, and prevented from injuring the quality and retarding the process of decarbonization which the iron is undergoing.

An improvement in the shape of the crucibles used in treating the ores of zinc, has likewise been patented, and consists in forming the crucible like a wine bottle, with the bottom rising high up into the interior of the same. The fire is built inside of this bottom, and the heated air, gases, etc., after circulating in the same, pass out under the edges of the bottle's bottom and ascends in flues built along its sides; economy of fuel is the chief object attained.

A process for making steel, in which the chief novelty consists in using pig iron that has been melted in contact with carbonic oxide, as a charge for the converting fire, has been patented; and likewise a process for obtaining wrought iron direct from the ore, which differs but slightly from well known processes; so also has been an arrangement of travelling bloomery or finery fires, that can in turn be brought under the hearth of a blast furnace. It is not known that this last device has been brought into actual use, and there

would appear to be many practical difficulties in the way of its successful operation.

In the process of hammering or shingling, welding and rolling wrought iron, letters patent have been granted for a machine, the invention of a well known iron master, who has heretofore distinguished himself in improvements in his peculiar branch of industry, which promises at no distant day to make a revolution in the forge and the rolling mill, and much decrease the price and improve the quality not only of the heaviest wrought iron shafting, but even of the smallest rods.

This machine consists of three or more conical frusta of metal, confined in a frame, with their smaller ends downwards, in such a manner that revolution may be imparted to all of them, and the axis of each of them is arranged as near as a right line can be, upon the periphery of an imaginary inverted cone, in such a direction that a line drawn through each axis would not point exactly to the apex of the imaginary cone above alluded to, but a little on one side of it. By this arrangement, a space like a hopper is left between the frusta, and gradually diminishes as it descends. Masses of iron at a welding heat, or there about, are thrown into this receptacle, and a rotary motion imparted to the frusta, which, on account of their axes being eccentric to the apex of the imaginary cone, gradually screw the heated mass downwards, compress it, and force it out through the circular space between the smaller ends of the frusta. The iron is therefore drawn out, and as it is drawn, the fibres are twisted so that they are placed in the rod much in such a way as are the yarns in a strand of rope. By giving slight eccentricity to the axis of the frusta, and great velocity of revolution, the strain of them upon their journals may be reduced to any extent required.

Puddlers balls may be squeezed in this machine, shafts of any size may be forged, and round iron of any dimension rolled. In the experimental machine a three inch billet has been rolled down at one operation, to a half inch rod, and to those conversant with forges, this feat will be sufficient proof of the capabilities of the apparatus, and of what may be expected from it when it shall have received those slight modifications which are the invariable result of the frequent construction and continuous operation of any new machine.

A patent has been granted for a machine for rolling the tires of railway wheels from a metal hoop, thus avoiding the bending and welding which are necessary when the tire is formed from a bar. This project is not entirely a new one, having been discussed some years since in England, but the adjuncts and modifications upon which the claims are based are stated to be essentially necessary to the complete success of the process.

Letters patent have likewise been granted for an improvement in the apparatus for regulating the contraction of cast iron car wheels, by means of currents of air, and also for improvements in casting floats and rasps, by means of segmental chills, one for each tooth, the whole being fastened together in a suitable frame; and for several other improvements in the methods of casting diverse articles.

A simple machine for diminishing the circumference of wheel tires, when this process shall have become necessary, either from the stretching of the same, caused by constant jar and wear, or from the shrinking of the wooden parts of the wheel, has been patented. The ordinary method is to divide the tire, cut out a piece, and then weld the ends together; but by this new process the tire is brought to a welding heat at the thinnest or most worn portion of its circumference, and those parts of its periphery on each side of and contiguous to the heated part are firmly clamped, not between the jaws, but each part in a separate jaw of a powerful vice; the jaws are caused to approach and the heated portion is upset and contracted in length.

A machine for forming the hour glass wire springs, now in extensive use for furniture cushions, dispenses with the mandril now used in their construction, but further description of its operation is not possible without the aid of drawings. This latter remark also applies to an ingenious machine for cutting the teeth of bevel gearing; and likewise to one for grinding and polishing axes and other tools by automatic machinery. The characteristic of the latter being that a rolling and traversing motion is given to the tool, which exposes every portion of it in turn to the grinding or polishing wheel.

Patents have likewise been issued for a machine for making hinges, for regulating the twist in screw augers, for forming wrought iron railroad chairs and for a very ingenious press for forming lead pipe, and applicable, likewise, to many other purposes. This press, unlike most others, surrounds the article to be compressed upon all sides; its top and bottom platens are stationary, and the sides, three or more in number, advance between them toward each other, and to the centre of the body to be acted upon, in such a manner that they always enclose it completely. If lead be the article to be acted upon, the sides are opened to the fullest extent, and the metal in a fluid state is poured into the box formed by them and the platens constituting its top and bottom. The ordinary die and core are made fast in the centre of either top or bottom, and when the sides are caused to advance toward each other the metal will be forced out in the shape of pipe.

Patents have been issued for a machine for cutting files, for several smiths' tuyeres, and for machines for filing and setting the teeth both of straight and circular saws, and also for a large number of machines connected with the manufacture of bolts, rivets, screw blanks, spikes and nails, all of them more or less useful, but none of them presenting striking features of novelty or interest, except where a continuously revolving die holder has been used in lieu of the vibrating or stationary ones hitherto employed. The use of this device renders the operation of the machine almost uninterrupted, and in consequence the quantity of bolts that can be manufactured in a single machine is much increased.

In the subdivision of locks and fastenings, inventions which are classed under the general head of Metallurgy, many patents have been granted, several of which are for bank locks, ingenious and complicated, of which it is impossible to give any clear idea without the aid of drawings. In the ordinary door locks many improvements have been made, two of which will probably come into general use — one consists in a slide or protector, as it is termed, which may be applied to any lock. When the door is closed, the bolt shot, and the key left in the lock, a movement of this protector on the inside shuts the outside key hole, clamps the key, so that it cannot be turned with a pair of nippers, and at the same time locks the latch or knob spindles. The other improvement consists in arranging the parts of an ordinary lock in such a manner with reference to either two key holes or one of a peculiar shape, that the same lock can be employed either as a right or left hand lock, and the key will in neither case need to be turned upside down. By using these locks, builders may order with reference only to the number of doors, paying no attention to the side upon which they are to be hung.

Patents have been granted for improvements in thumb latches, and in porcelain rosettes for door knobs, and also for one on the glass knob, which, although it may appear trifling, still is believed to be of great utility. As the glass or mineral knobs, as they are termed, are usually cast upon solid spindles, they are liable to crack from the unequal expansion of the metal and the glass — many of them do so, and many others are mounted upon the doors, not showing the crack visibly, but with such a want of cohesion among some of their particles that the slightest blow reduces them to fragments. This difficulty has been remedied by making the metallic spindle a thin tube, thus presenting great surface with but little weight; and knobs cast on such spindles may be seen in this office, with which, used as a hammer, a large cut nail has been driven to its head in a plank.

Patents have been granted for ingenious window shutter and blind openers and fasteners, for sash stoppers and balances, for shears, punches, wrenches, etc., which time and space prevent being described.

STEAM AND GAS ENGINES, &c.

In class No. 6, under which are examined all applications for patents for improvements in steam and gas engines, and their appurtenances, some fifty patents have been granted. Among those for improvements in boilers are two for removable fire boxes. The invention consists in constructing them in such a manner that they can be removed at will from the rest of the boiler, by unscrewing certain bolts and tubes, which latter form water and steam connection between the water linings attached to these boxes, and other parts of the boiler. In those boilers, especially locomotive ones, where anthracite coal is burned, either with a strong draft or with a forced blast, this contrivance promises to be of utility.

A patent has been granted for placing inside of the ordinary tubular boiler flue a sheet metal screw, with a very small spindle, around which it is formed. This screw is capable of being revolved, and its periphery is in contact with the inside of the flue. The flame and gases, instead of passing directly through the flue, must, it is obvious, be twisted round and round by these threads, and thus increase to a great extent the effective length of the flue. When the flue becomes choked to any extent, by soot or ashes, if the screw be revolved it will act like a common mill conveyor, scrape the sides of the flue, and carry out the dirt at either end, at pleasure, according to the direction in which it is turned.

A patent has also been granted for certain devices necessary in arranging several sets of grate bars, one above the other, in locomotive boilers, by which it is contended that a greater amount of coal than usual can be burnt within the same fire box rooms, thus attaining a long sought desideratum, namely, increased grate surface, without increased size of fire box.

A curious arrangement of boiler by which a great amount of water is said to be evaporated, with a comparatively small quantity of coal, has been patented. In describing this boiler it may be said to consist first of a hemisphere with a flat bottom, to which are attached water legs formed by placing one tube inside of another, the space between them being filled with water, connecting at the top with the water on the bottom of the hemisphere above described. This space is closed at bottom by a ring shaped piece of metal, and the fire-grate is formed inside of the inner tube, with a sheet iron box below it, to

which air is blown to be heated, and afterwards supplied to the fire. Both the tubes are conical, with their smaller ends down, and the outside tube increases faster in diameter than the inner one; this peculiarity causes both the fire and water spaces to be greatest in area at the top, just under the bottom of the hemispherical chamber. A number of holes are cut through these tubes near their upper ends, and the one in the outer connected to its fellow in the inner, by a short flue riveted fast to both. Outside of the upright water space and at some distance from it, another larger tube also formed like a frustum of a cone, is attached to the outside of the bottom of the hemisphere; its lower and smaller end, extends below the hot air box above named and all other parts of the boiler, and connects with the chimney or smoke pipe. Opposite to the short flues above spoken of, as passing through the upright water space, holes are made in this latter larger tube, and through them are introduced pipes, by means of which hot air from the air box is forced into the flame, meeting it as it comes out of the fire-box, through the short flues. The gaseous products of combustion are thoroughly consumed at this point, being just at the place of greatest fire surface, and afterwards descend between the jacket and the water space; impart their remaining heat to the coldest portion of the water, and the air in the air box, and thence escape by the chimney. This boiler would appear to be essentially non-circulating: the cool water is supplied near the bottom, and rises gradually, becoming hotter and hotter, till it is converted into steam. Moreover, the most intense heat is applied to the hottest water, at the point of most extended fire surface. Almost every principle comprised in this boiler is old; but the arrangement of the devices which bring these principles into effective and economic action, is ingenious and simple in the extreme, and on this arrangement the patent is based.

Patents have been granted for other arrangements of boilers; for the more convenient application of salinometers to marine boilers; for feeding apparatus, and for indicators of too intense heat upon the flues; also for filters, specially applicable to boilers used on our western waters, the arrangement of one of which is ingenious and practical.

A patent has been granted to the original inventor, for a modification of his arrangement of the well known half beam engine, which admits of a stronger attachment to the vessel of some of its essential parts; and to another party for an arrangement peculiarly fitted for low pressure engines, such as are employed in screw propeller steamers, where many revolutions per minute are required. The latter improvement consists in working the air pump piston at a much lower speed than that of the steam piston, and in an arrangement, by which in case of a break down, in either air pump or condenser, the engine can be worked at once as a non-condensing engine.

An arrangement of two single acting expansive cylinders, both attached to one shaft by cranks, forming with each other an angle of 180°, is designed to correct a well known theoretical defect in the action of expansive engines, and to give the steam greatest leverage when it has least tension. The idea has been still further carried out in beam engines, by placing the shaft to which are attached the cranks, set as before mentioned, nearer to the cylinder than usual, and making both cylinders alternately perform work on the down stroke only.

Many applications have been as usual made for letters patent for inventions in that mechanical chimera, the rotary engine. Most of these have been rejected, the path having been so often trod, that but few spots not imprinted with the inventor's track are to be found. Some of them have been patented, more on the ground that they are new and not injurious, than as presenting

any really practical or valuable contribution to the arts. Two however of the patents granted for improvements in these machines, must in the exercise of a proper discretion, be considered as presenting exceptions to the rule of action above set forth. One of them is for an attachment of the ordinary moving steam abutment of these engines, to a strong arm projecting at right angles from it, to which it is immovably fastened. This arm plays upon a suitable pivot, and the abutment or stop in accommodating itself to the motion of the piston or pistons, describes an arc of a circle instead of a straight line. The strain upon the stop, caused by the pressure of the active steam on one side of it, which is not counteracted by the vacuum, or merely atmospheric pressure on the other side, is by this arrangement transferred from the guide and packing, to the point on which the arm plays, and which it is unnecessary to make steam tight. One cause of great leakage and friction in these engines, is thus in a measure dispensed with.

In the other patent, the claims rest upon such a formation of the stops as will prevent to some extent the leakage of the steam past their sides, between them and inside of the steam case; also upon a certain configuration of the pistons, in combination with a method of operating the stops, calculated together, to make the engine wear more truly, and run with less waste of steam and less friction.

Patents have been granted for several species of valve and cut-off motions, two of the latter of which especially applicable to puppet valves, are so constructed as to enable the engineer to cut-off the steam at any point of the stroke he may desire, and at the same time open the valve to its greatest extent, much more quickly than is usual. In both these contrivances, both emanating from the same inventor, only one eccentric is employed, and although they are rather complicated in other respects, it is believed that by the aid of the perfect workmanship consequent upon the use of modern shaping and fitting tools, they can be so constructed as to become practically useful. Two patents have been granted for machinery connecting the cut-off valves with the governor, in such a manner, that the period at which the connection between the boiler and cylinder is closed, is dependant upon the velocity of the engine. This plan is much more economic than the old one, of connecting the governor with the throttle valves; but the idea is not new with these inventors, their patents depending in both instances upon the arrangement of mechanical movements necessary for carrying it into effect.

Patents have been issued for modifications of piston and stuffing box packings; for improvements in the position and method of constructing the foot valve, and also for a method of constructing a condenser, consisting of concentric annular chambers, each alternate one occupied by steam, or the medium of condensation. The novelty is not in the arrangement, which is an old one, but in the method of manufacture. Two sheets of copper with one of zinc between them, all applied closely together, are bent into a cylindrical shape. Several cylinders thus formed of various size, are arranged concentrically, with their corresponding ends, all upon the same level; both of these are then introduced to a certain extent into the copes of two ordinary moulders' flasks passing about midway into a cavity left therein of the proper extent for the condenser heads and double their thickness. Brass in a melted state is then poured into the cavities, and the ends of the copper cylinders having been previously tinned, the condenser heads are at the same time cast and firmly attached to the cylinders. The whole apparatus is now carried to a planing machine, and the heads planed down until the ends of the cylinders

are exposed. The zinc is now melted out from between the copper plates, and the condenser is finished with the exception of the external case and heads. Tubes of any shape may be employed instead of the cylinders, and a cluster of them in lieu of the concentric chambers will then constitute the condenser.

One of the packings for stuffing boxes, above referred to, is the contrivance of the same inventor. It consists in surrounding the piston rod inside of the stuffing box with a piece of leather, vulcanized India rubber, or some other fit material, in the shape of an hour glass without top or bottom, its neck being in contact with the rod, and its wide ends resting against the periphery of the brass collars or glands usually placed in the top and bottom of the box, which in this case extend into it farther than is customary. A communication is formed between the interior of the stuffing box and a force pump, and fluid is pumped into the space between the inside of the box and the outside of the hour glass, until the pressure in the cavity is a little greater than that in the cylinder; all leakage of steam or vapor is thus prevented, and the rod may be said to move through a fluid packing. Patents have also been granted for several spark arresters, and for an improved arrangement of locomotive wheels; the latter consisting in placing two four wheeled trucks at each end of the engine, with a large pair of driving wheels between them, the axle of the latter being above the top of the boiler. The patent is based upon the combined arrangement.

NAVIGATION AND MARITIME IMPLEMENTS.

In this class between twenty and thirty applications have been patented. The subdivision of propellers having as usual occupied a large proportion of that portion of the examiner's time, which is appropriated to the consideration of inventions in nautical matters. Many applications have been made based upon alleged novelties in the feathering or the vertical float paddle wheel, of the latter of which the well known Morgan's wheel may be taken as the type. All these cases have been rejected as presenting nothing essentially new, and actual but not original inventors have been disappointed merely because they do not make themselves acquainted with the history of invention on this important subject. Such occurrences are, of course, frequent in other ranges of invention, but here is presented the singular fact, of every invention in a certain class of machines having been anticipated.

A patent has been granted for certain novelties in the form of screw propellers, by which sheets of metal much thinner than usual may be employed in their construction; also for a species of sculling paddle, working under water near the vessel's stern, and likewise for certain modifications of the kind of paddle employed by Fitch in connection with his first steamboat upon the Delaware. Both of the latter are more distinguished by ingenuity and complication than by practicability. Certain devices for propelling boats by reaction, a stream of water being forced out on both sides, above the water line, have also been patented. Some new arrangement of a centrifugal pump and the induction channels thereto, and likewise of the pipes and their joints, are the basis of this patent. A model boat constructed according to this plan has been propelled at high speed in the harbor of New York.

Several patents have been issued for life preservers of various kinds, among which are two for life boats that deserve notice; in one of these the air cham-

bers at the bow and stern are so formed and placed that the boat cannot rest in the water in any other position than an upright one, and in the other the bottom is a water tight box sliding up and down between the sides; if the boat be upset, and persons clamber upon its bottom, the latter slides down between the sides, leaving the cavity again uppermost and the boat in fact in an upright position: the thwarts are so arranged as to conform themselves to this new position, and after the water is bailed out the boat is again ready for use.

A patent has been issued for a certain combination of old parts in a steam-boat, in order to produce a vessel that will be able to tow a load in proportion to its power on canals, and at the same time produce no wave injurious to the banks, the wheel being at the same time arranged in such a manner as that it can receive no injury from the contact with lock-gates or bridges. The boat itself is of a well known form, a single bow and a double stern having a canal or open space between the sterns extending forward about half the length of the vessel. In this open space the wheel with a peculiar bucket is placed. This bucket, or these buckets or floats, instead of being, as usual, plain surfaces, are cylindrical with their concave surface arranged in the direction of the wheel's revolution. The lines on these portions of a cylindrical surface parallel to its axis, are not parallel with, nor in the line of radii of the wheel, but are bent from their inner to their outer ends backwards in a contrary direction to the motion of the wheel, so that they strike the surface of the water when entering in a line nearer to the horizontal than usual, and leave it in nearly a vertical direction. According to the ideas of the inventor all these peculiarities are useful when the wheel is placed as it is in his boat. As the boat passes along, the water rushing upwards from the bottom into the forward part of this canal, would pass by and over the plane bucket entering at the usual angle, but is met and grasped by the concave surface of his paddle entering nearly horizontally, which as it leaves the water vertically by virtue of the same inclination produces almost no wave or swell. If any hurtful amount of the latter be produced, the difficulty is met, and the wave smoothed by another contrivance termed a wave queller, consisting of a curved piece of strong sheet metal, with its convex side downwards, attached at one of its ends by a hinge to a beam crossing the open passage just aft the wheel, and at the other to a screw, by means of which it can be raised or depressed. When the boat is in motion this screw is acted upon and the queller shoved down upon the surface of the water just as far as is necessary to smooth down the swell of the paddle. This boat has proved so successful that its proprietors have been permitted to run it on several canals free of toll.

A patent has been granted for a very ingenious capstan, having an arrangement of cog wheels and pinions within the head and barrel, by means of which the following result is produced.

When a rope is wound round the drum, and the men at the capstan-bars are heaving upon them, if the strain from any cause becomes so heavy that the men are unable to heave it further, then by merely changing the direction of their motion, they act upon the rope in the same direction, but with diminished speed and increased power, obtained by the gearing. When the heavy strain is overcome, the men again change their direction, and the rope comes in with the same speed as at first. Two other patents have been granted for modifications of the so termed pumping windlass, and one for improvements in the screw and nut steering apparatus; another for improvements which enable an anchor to be let go from the cathead with ease and safety; and one

for improvements in deep sea diving bells, enclosed on all sides, and enabling the operator to work under the ordinary atmospheric pressure, instead of under that due to the depth of water beneath which he is immersed. The novelty in this case, consists in the construction and method of fitting the various grasps and handles which pass water tight through the shell of the bell, and enable the diver to act from the inside upon substances outside of the same. Letters patent have been issued for improvements in diving bells, intended for operating in smooth water. The bell, in place of being suspended by a chain or rope, is attached to a strong timber frame, greater in height than the distance from the bottom to the surface of the water, and this frame is arranged in such a manner that it can be depressed and raised upon guides attached to the inner sides of a twin boat or scow.

Patents have been granted for improved machinery for paying the seams of vessels; for improvements in the arrangement of halyards and downhauls, applied to fore and aft sails, rendering them easier to handle and less liable to tear, and for several other improvements in the construction of vessels, or parts of their equipment, which do not require special notice.

CIVIL ENGINEERING AND ARCHITECTURE.

In this class have been patented several improvements in bridges, one of which consists in shaping and framing the top and bottom string pieces of ordinary truss bridges, in such a manner that they shall constitute an elliptical ring instead of the two long sides of a parallelogram, as is usually the case; by this arrangement the upper stringer becomes an arch, the thrust of which is met and counteracted by the tendency which the lower stringer has to separate in the centre, when the bridge is loaded. Both these parts of the bridge have heretofore been curved, with their concaves towards each other, the novelty with reference to such a bridge, would consist in uniting their ends by a continuous curve of equal strength with either of them, through which the tendencies to rupture act in opposition to each other.

Another improvement consists in a method of attaching the truss frame to the arch of a compound bridge, in such a manner that both may be adjusted to each other, in order that each shall sustain its share of the load. A third patent is based upon improvements in swing bridges for railroad tracks. In the ordinary swinging bridges, the clear width of the draw, or space for vessels to pass through, is narrowed by exactly the width of the track and its supporting timbers, when the bridge is swung open. But in this, each lengthwise timber swings on its own separate pivot, and the cross pieces by which it is attached to its fellows are pivoted at their joints. The first named pivots are not in a right line perpendicular to the track, but in an inclined one, each a distance equal to its own thickness behind the other, when looking from the centre of the draw. When the frame thus assembled and pivoted which constitutes the draw, is thrown open, the various parts close in upon and lie close to each other, in a manner similar to the various parts of the ordinary parallel ruler, and obstruct the opening only by the aggregate width of the string pieces, instead of the extent covered by them when in place for the cars to cross the opening.

In the subdivision of railroads, two patents for improved compound rails, deserve notice. The construction of one of these may be described as follows; saw or split in two, any line of ordinary T rails in the direction of their length, which would leave besides the usual openings at the junctions, another

slit the whole length of the track from top to bottom of the rail; then draw one set of halves in either directions, until the junctions between its parts come midway between the junctions of the other set, and bolt the whole together by transverse bolts. A compound break joint rail is thus formed, preventing to a great extent, the jar experienced in passing from one rail to another, and rendering them less liable to be thrown from their proper place on the track. The other rail may be styled an improvement on this one. It has the same peculiarities, but in addition, the sets of halves are formed in such a manner as to leave a continuous hollow or tubular space the whole length of the rail, into which are inserted at the junctions, iron cores, rendering the rail firmer at these weak points. It differs likewise in its exterior form, its cross section being such as would be produced by rounding off the corners of a parallelogram, and bending in all its sides. The rail is thus, as it wears, susceptible of four reversals. A chair peculiarly fitted for supporting it, forms a part of the invention.

Several patents have been granted for arrangements of levers, rods, bolts, &c., connected at one end of the series to railroad switches, and acted upon at the other by a trigger, or its equivalent carried by the locomotive, the arrangement being such that the engine driver is enabled to shift the switch, opening it in either direction at will, without stopping the train or descending from the engine. Another patent has been granted for a very curious modification of a toggle joint, applied in the rail itself, at or near a point where a train of cars is required, when going in one direction, to pass from one track to another, or a turn-out. The up train, for instance, always turning out to the left, and the down train proceeding straight forward. As the forward wheel of the locomotive of the up train presses upon the toggle, the latter acts on levers or their equivalents connected with the switch, and opens the same, forcing the train to enter the turn-out. When the down train comes to the switch, the wheels shut it as usual, then run along the track and pass over the toggle, but when striking it in this direction, the toggle, although it drops down level with the rail, does not act upon the train of levers or the switch; it being clear if it did that the switch would be shifted while the train was upon it, and the cars thrown off. And this is the peculiarity upon which the patent is based, the toggle acting when it is pressed by a train coming in one direction, but having no action, although pressed down by a train approaching from the other.

Patents have been granted for improved methods of ascending inclined planes with locomotive engines; for an apparatus attached to the guards of steamboats for lifting them over shoals; for improvements in the adjustable blocks that support the bilges of ships when in dry dock; for machines for drilling rock, boring earth, dredging and excavating, and in the subdivision of architecture for weather strips and water guards, and methods of constructing stairs.

FIRE-ARMS AND IMPLEMENTS OF WAR.

More than twenty-five patents have been granted in this class, the greater number of them for improvements in repeating or breech loading guns of various descriptions. The great demand for arms of this class during the war with Mexico, and that still existing for supplying the frontier men and those who are travelling overland across the great territories of the west, have proved a strong incentive to invention in weapons of this description. To these may

be added the accounts that have reached us through the foreign periodicals, of the wonderful execution of the so termed Prussian musket, with which, it is stated that correct practice may be made at a range of 800 yards, and that instances have occurred in the war between Prussia and Denmark, where the artillery men of the latter have been picked off at their guns by the infantry of the former, when outside of the effective range of grape shot. This gun may be described as consisting of a barrel open at both ends, but stocked in the ordinary manner. It is loaded by pushing a cartridge into the breech or end nearest the butt of the stock; this end is then closed by a piston or plug of metal which is slidden along and forced into it by a handle; the plug is then turned some twenty degrees upon its axis, the handle entering into a slot in a piece of metal attached to the stock, thus fastening the piston so that it can not be forced backwards when the charge is exploded.

The explosion is effected by means of a needle, moving in a hole in the axis of the piston, which is retracted into the piston and confined there, by the combined action of pulling back the same to open the breech, and shoving it forward to close the opening after the cartridge is in position. A pull upon the usual trigger liberates the needle from its catch, when it is forced forwards by a spiral spring, and its point passes out of the piston into the cartridge, and through the powder contained in the same, until it comes in contact with a small pellet of percussion powder, located in the cartridge, between the powder and the ball. This pellet is fired by the concussion, and inflames the powder from the front towards the rear of the barrel. This gun has been described as a necessary basis for the correct understanding of several others, modifications of, and improvements upon it, patented in this country during the past year, and its advantages would appear to be threefold; first, great rapidity of firing; second, accuracy, and third, extent of range. The former is dependant solely upon the loading at the breech. The second advantage is secured by the breech loading, which permits of a ball being used of greater diameter than any portion of the bore, except for a small distance near the breech, the ball being slugged by the explosion of the powder, and if necessary, forced to fit tightly into rifled grooves; it has therefore no windage. The third result depends upon the last mentioned cause, and the fact that the powder is fired from front to rear, the combined consequence being that the whole charge is exploded, and that none of the gases can escape between the ball and the barrel. A very simple improvement on this gun has been patented, the application of which renders it impossible to fire the gun even by a pull of the trigger unless the breech is in proper position and locked. Three patents have been granted for guns, which have, in addition to the features of the Prussian gun, a reservoir of cartridges under the barrel, and machinery which elevates one charge at a time from the same, and places it in front of the sliding piston, which latter, when moved forwards, shoves the cartridges into place for firing.

A patent has been issued for what appears to be a great improvement upon the ordinary many barreled revolver. It consists in attaching the barrels firmly to the stock in such a manner as to be incapable of revolution, while the lock is so contrived and arranged that it is cocked and discharged by pulls on the trigger, the hammer travelling from barrel to barrel in succession, and firing one after the other. It is obvious that this arrangement of revolving hammer and stationary barrels, permits of more correct practice than the usual one. A patent has been granted for an improvement on this pistol, consisting in an important simplification of the lock. Many new modifications of that species of lock which is cocked by a pull of the trigger have been patented, one of

which is so constructed, that the gun is fired when the pull on the trigger is slacked. Patents have been issued for loading muzzles of rifles; for various kinds of breech loading fire arms; for improvements in concealed locks; for modifications of the faucet breeched gun, and a magazine adapted thereto; for a breech loading, and for a sectional cannon. The construction of the latter may be described as follows: drill any convenient number of holes through the metal of a cannon, midway between the outside of the bore and the outside of the gun and parallel to its axis, then saw the gun through at right angles to these holes in many places. A number of disks will be left each with a corresponding central hole for the bore: with numerous smaller apertures, corresponding in each section, the result of the drilled holes first spoken of, and with an outer periphery, shaped in accordance with that part of the gun from which the disk has been cut. Now if disks of wrought iron formed precisely like these, are manufactured, assembled properly together, and long bolts passed through the small holes, a sectional wrought iron cannon will be formed, which admits of being taken apart at will. Patents have been granted for a very ingenious arrangement of punches, dies, transferers and feeding apparatus for punching out and knocking up percussion caps at one operation; for a machine for spherifying leaden balls; for an improved method of boring muskets, and for improvements in that kind of powder magazine, whose walls are double, with a provision for circulating water in the interstices in case of fire occurring on board the vessel. These improvements consist in a self-acting apparatus for letting on the water, and in a peculiar kind of entrance, preventing the passage of sparks, &c., unless carried in by the person entering. A patent has also been granted for an improved method of making small shot, based upon forcing a strong current of air up through the tower, meeting and to a certain extent supporting the descending lead. Shot of certain sizes can by this process be made in a sheet iron tube in an ordinary house, instead of in the high tower usually employed.

GENERAL MISCELLANEOUS.

In this class but few patents have been granted, one of which is for a street sweeping machine, having certain arrangements of the revolving brush wheels, which sweep the dirt upon the apron; and of the apron itself, which render the machine better adapted to uneven pavements. Another has been issued for improvements in that species of animal trap, in which the weight of the animal to be caught, acting upon a swinging platform, springs the trap. The improvement consists in an arrangement of counterpoise, applied to the platform in such a manner, that no animal of less than any given weight can spring the trap. Improvements in the expanding fish hook have likewise been patented, also a simple and ingenious hook, which will serve if needed for a trap for small animals.

Improvements in bell tents; in ice crushers; fire escapes, and skates, have also been patented.

I have thus endeavored to give briefly as possible, a description which amounts to but little more than an enumeration of some of the inventions, which came under my notice during the past year, and would remark, that a full and complete digest of these discoveries, would if time permitted, be laid before you.

All of which is respectfully submitted.

HENRY B. RENWICK, *Examiner*.

SIR:—In accordance with your instructions, I have the honor to submit a report of the history and present condition of the business of the office committed to my charge.

In my annual report for 1848, I gave as the number of applications on hand 168. But it was found on investigation that 12 applications had been overlooked, and that the number of cases upon my desk not examined on the first day of January, 1849, was 180. I have received during the year 1849, new cases 463; thus making the whole number of applications 643. Of these, 75 have been transferred to the classes of the other Examiners, and 569 have been acted on by me.

On the 31st of December I had no cases unexamined on my desk.

The classes referred to me for examination are the following:

1. *Agriculture*—embracing all instruments used in cultivating the ground, and collecting and preparing its various products for the market.

2. *Chemistry*—embracing all chemical processes and chemical compounds.

3. *Leather*—embracing all operations in tanning and dressing leather, including the tools and machines used for such purposes; also the manufacture of leather into boots, shoes, saddles, harness, and all other articles usually made of leather.

4. *Household Furniture*—including machines and implements for domestic purposes, or such as are peculiar to the house.

5. *Wearing Apparel*, and articles for the toilet, with the construction of the implements and machines used for their manufacture.

Of the whole number of cases examined by me, 245 have been ordered to issue, and 354 have been rejected, or postponed for amendment, or are otherwise pending. It should be observed however, that the above statement does not give the amount of work done at my desk, but only an approximation to it. Many of the rejections noted above, are re-examinations of cases brought up again from the last year's work. Also many of the issues of 1849 were final actions on cases pending in 1848.

Many of the applications are rejected from defects in claims, in description, or from other causes, and afterwards from modification, explanation, or other amendments, claims are admitted. So that it often happens that a single application is at first rejected, then the applicant asks a reconsideration, insisting on the same claim, under plea of a want of explanation, or a misunderstanding of the invention by the office. The application is examined again, and rejected as before; finally he relinquishes the main claim and accepts one for some minor point. Thus the same application that has been twice recorded as rejected is also at last recorded as issued—and three distinct actions are had on the same application, two rejections, and one issue.

Again, it occasionally happens that an application is rejected once, or twice even, then withdrawn and filed anew and rejected again, and afterwards by relinquishing parts of the claims, a patent is finally issued on the remainder. Thus three or four rejections and an issue may arise out of a single application.

Each of the five classes referred to me for examination is divided naturally into several groups, the peculiarity of which generally depends upon the object to be obtained.

These groups are well defined in *Agriculture, Household Furniture*, and in *Leather*; while in *Chemistry* they are as various as the subjects of the invention.

It is a fact worthy of remark that the progress of invention in the different classes, or in the groups of each, is by no means uniform. One group of subjects obtains notoriety from a signal invention; and the attention of inventors is directed to it, and new applications of mental energy are concentrated upon it, until new inventions have covered the ground, embracing not only the accomplishment of the work itself, but exhibiting a great variety of methods in detail, either different from, or equivalent to, such as were before in use.

Thus, every new field of invention opened by one, brings about it a crowd of other inventors, some to improve on the original, and others to pirate and rob the originator of his just earnings. Such was the fate of the inventor of the cotton gin, and such is now being designed on the inventor of the electro-magnetic telegraph. Each of these inventions when first promulgated was regarded by most as chimerical; but the first evidence of success elicited the attention of others, and soon numerous competitors appeared to contend for the honor or profit of the invention.

For many years of the earlier history of the American Patent Office, stoves, washing machines and ploughs were fruitful sources of invention. Since then new fields of industry have been opened, and new subjects of invention have been introduced. The labors of Whitney served to people the cotton growing parallels, while those of Fulton transported their products to the market, and those of Arkwright fitted them for the consumer. Each of these great landmarks served in turn as common centres, around which thronged hundreds and thousands of inventors, whose names and whose labors will be handed down to the latest posterity.

The currents of invention in the United States are controlled, not by the will, or the munificence of individuals, or state or general government, but by circumstances or the necessity of the case.

The sparse population, the abundance of prairies in the west, the ease with which almost any one may become a landholder and owner, the consequent high price of labor, and the ease with which animal power can be produced on the soil; all these conspire to force upon the agriculturist the necessity of cultivating the soil by animal power. To devise and construct suitable implements for this purpose, constitutes the province of the inventor, and as we shall see in the sequel, he has not been idle. Valuable inventions have been made. The most important improvements in agricultural machines the past year, are believed to be in what are called *seed planting machines* and *harvesting machines*. The former embrace the planting of every variety of seeds that are used, and the latter are mostly confined to grain, grass and cotton; these will be again noticed in their proper place.

The most important and valuable inventions that have come under the cognizance of your examiner during the past year, are to be found in the class of chemistry. Two of these are the results of the labors of two distinguished professors of chemistry, and the third from those of a highly respectable practitioner in medicine.

The first is a process of manufacturing sugar on the plantation, so as to save a large portion of the loss sustained by processes now in use.

The second consists in a process of converting animal matter, as fish,

horseflesh, butchers' offal, &c., into ammoniacal salts, or other more fixed compounds, that can be used for manure or other purposes.

The third invention referred to consists in the introduction of a new ingredient, and of a new, simpler and safer process, in the manufacture of printers' ink.

Although it has so happened that the patents which will probably be granted for these several inventions have not yet been issued, in consequence of the prolonged correspondence, still it was deemed proper to announce them and notice them in the present report.

In all the departments of the arts, the progress of inventions constantly narrows the limits of each, until we at length arrive at a point where the invention is very small, or where none can be found worthy of a patent. Such is the present condition of several of the groups, as bee-hives, washing machines, ploughs, churns and bedstead fastenings. Inventors have so much refined in their devices and claims on several of these subjects, that the claims are often for distinctions without a practical difference. Such is the case especially with churns and washing machines; and the same remark applies equally to ploughs and bee-hives. The field of invention in all of these groups is so narrowed down that there seems to be left little room for improvement. In some of these the current of invention seems to be directed into a channel that can never give any very useful results. Such is believed to be the case with the invention of moth traps in bee-hives. This subject, however, will be further discussed under "Bee-hives."

We will now consider the individual groups of the several classes of subjects examined by me.

AGRICULTURE.

Agriculture constitutes the largest class in my department. There have been granted in this division 117 patents.

For churns and butter workers	10	Grain and rice hullers	8
Ploughs	15	Fanning mills	9
Cultivators	6	Corn-shellers	7
Seed planters	20	Straw-cutters	5
Rakes	4	Bee-hives	5
Harvesting machines	15	Curry combs	2
Threshing machines and separators	9	Ox yokes	2

Churns.—As most of this subdivision was transferred to Dr. Page in the early part of the year, and as few important improvements have come under my notice, I would respectfully refer you to Dr. Page's report for further information on this subject.

Ploughs.—Of the fifteen ploughs patented, only one seems to require any special notice, as they are, with this exception, claims on unimportant devices.

The plough referred to is of that denomination called hill-side ploughs, and the peculiarity may be described in a few words:

A horizontal frame is constructed somewhat resembling that of the body of a wheelbarrow, but the handles, like those of the plough, project upwards and backwards. Near the middle of the body of the frame is made a fore-

and-aft rectangular opening, in which the two shares, fitted to a cross axle, rotate like the wheel of a wheelbarrow. Although there is no wheel in the plough, the rotation of the two shares describes a circle in the direction and position of the wheelbarrow wheel. And if we suppose two ordinary cast-iron ploughshares, made fast to the periphery of the wheel of a barrow, in the rectangular opening, and the shares so arranged that one shall be on the upper and the other on the lower part of the wheel, one pointing forward and the other backward, the bottom of the plough being in the line of the tangent to the circle described by the rotation, we shall have some idea of the construction of the machine. The peculiarity of the feature in the plough is, that it rotates in the direction parallel with the furrow, instead of at right angles to it, as in other ploughs of this class.

The shares are locked by means of a sliding cross-bar, moved by a handle. The cross-bar is received against a notch in the mould-board that is uppermost.

Cultivators.—Six cultivators have been patented during the year. Most of these are of ordinary construction, and the claims for minor improvements that do not set forth any very prominent new features.

One of the most important of these is worthy of some notice here. It consists of an ordinary frame of the triangular form, five or more teeth arranged in three or more rows, so fitted upon a slide-block as to slide in slots on cross-bars from side to side, and governed by means of screws or screw rods that pass horizontally through the side pieces and into the block that supports the tooth, and moves with it from side to side. The screw rods are used to set the teeth at any required distance from each other in a side direction. Besides the arrangement for the side movement of the teeth, the latter are hinged to the sliding blocks so as to admit of a swinging motion backwards and forwards. The teeth are braced in the rear by screw rods passing downwards and forwards at an angle of forty-five degrees through a projection on the rear part of the sliding block, which rod is united to the back part of the tooth by means of a hinge joint similar to the first. By means of these screw bracing rods and set nuts on each side of the projecting part of the sliding block, the teeth of the cultivator may be set at any inclination backwards and forwards that circumstances may require.

Seed Planters.—There have been patented twenty seed planters. One of these was a re-issue, and one an additional improvement.

It will be evident, from a comparison of the number of patents granted the past year with those of any former year, that from some cause an unusual interest has been excited in this class of labor-saving machines.

It would be difficult to set forth, without the aid of drawings (as we are compelled to do,) the features of improvement in devices for seed planting, except in a very general manner. In seed planting, whether it be in hills, in drills, or broadcast, it is important that the manager of the apparatus should be able to have the seed-distributing apparatus and the cultivating and covering apparatus, each and all, perfectly at his command and control; so that he may be able, by a single movement of a lever, to stop instantaneously and simultaneously the seed-distributing and the cultivating apparatus. Most of the seed planters herein referred to contain various and modified devices for this purpose.

When seed planters were first introduced they were generally small machines, and generally confined to drilling in a single row; now it is common to work eight drills or distributing boxes to a machine. And as the number

of distributors increases, so increases the necessity of controlling and working the whole machinery simultaneously. The device, therefore, which, for the controlling and moving simultaneously the seeding and cultivating parts of a one-drill seed barrow, is of little moment, becomes vastly important in a machine with eight or ten. But the device is the same in the latter as in the former, except the multiplication of the individual drills, (and this last has not been considered, in the practice of the office, a patentable invention.)

Now it so happens that a one-drill seeding machine was patented in 1841, having in it the simultaneous movement above referred to, but so imperfectly described, represented, and claimed, as to lead one to believe that the inventor himself did not regard it of much importance, or perhaps did not understand its bearing on the subject until others had introduced larger machines with devices for attaining the same end. The device was so obscurely set forth that it did not attract the attention of the office until the case was called up for a re-issue, and in accordance with the law of re-issues, the patentee was permitted to re-describe and cover by claim those devices that were found in the original model and drawing, although not clearly set forth in the specification.

This seems to be one of those cases where the law of re-issues acts badly; for inventors, not knowing that devices which are so obscurely set forth in existing patents as not even to give notice of their existence, may come up in a new form in a re-issue, and cover the field and labors of those who had supposed themselves working on unoccupied ground.

There is one other point worthy of notice, in the improvement of teeth common to seed planters and cultivators. It is the use of springs to prevent the breaking of the teeth by means of firm obstructing substances, as stumps, fast rocks, &c.

It is not new to use springs in the construction of cultivator teeth, but so using them as to be able to adjust their resistance, to that of any given soil without yielding, but when they meet a firm resisting body, the points of the teeth yield and draw backwards, and the tooth thus slides over the obstruction; this is new in cultivators and seed planters. The device is thus constructed: The teeth are arranged on a horizontal rod, which passes through them about two thirds the way from the points upward, and extends from side to side of the machine, so that they are susceptible of vibrating backwards and forwards on this rod, as a pivot or axis. The head of the tooth is sustained in its ordinary position, by means of a spring resting against its anterior face. The strength of the spring is adjusted by a screw, so as to make its resistance equal to the soil it is intended to cultivate.

Harvesting Machines.—Under this head I have included all the machines used to cut and collect grain and grass, as well as cotton harvesters and bog cutters.

On grain and grass harvesters there have been made several minor improvements, but no new general feature has been invented during the year. Twelve grain and grass harvesters have been patented. Most of the improvements have been made on the contrivances for raking and delivering in bundles the cut grain or grass, and depositing the same in such manner as circumstances require. These devices are complicated in their character, and could not be understood from a description without drawings. In one kind of machine the grain is cut and thrown upon a platform, whence a rake, the head of which lying

immediately under the platform, and the teeth of which project upward through the spaces between the planks of the same, at each backward movement, sweep the grain from the front to the rear, whence it is deposited on the ground in suitable parcels to be bound. Much of the art of inventors has been applied in improving the rakes and the platforms.

One important new feature in grass cutters, has been patented during the year, the design of which is to enable the cutters to clear themselves, without any artificial aid from the man who attends the machine. It is an improved form of cutter tooth, and consists of the ordinary horizontal vibrating blade, with a saw-tooth edge, and the device is the punching of a triangular hole through each tooth, leaving the edges of the hole sharp, so that when the blade vibrates in the horizontal slots through the fingers, the sharp edges of these triangular holes, shall cut and scrape off any gummy or other matter that might collect on the blade.

Of the above mentioned twelve grain and grass harvesters, two are designed for collecting clover heads, and do not differ very much from some of the earlier of the grain harvesters, which were designed to cut off merely the heads of the grain. The cutting apparatus consists merely of a horizontal row of fingers projecting forward, and between each, the contiguous edges of the fingers being made sharp, and meeting at the base or hand portion, the clover heads are carried in, as the machine moves forward, and either cut off at the sides, or pulled or cut off at the base of the fingers, and the arms of the reel sweeping past, or some other analogous device, sweeps the heads backward upon the platform where they are collected.

In this group are included one patent for a scythe snath, one for a bog cutter, and one for a cotton harvester.

The Cotton Harvester is a new machine so far as is known to the office, and when we take into the account the time, and the expense to the planter of gathering his cotton in the ordinary way, it is but justice to say that he who succeeds in using machinery to pick the cotton from the bolls, will confer a favor on the cotton growing region next in importance to that of the cotton gin of Whitney.

This machine is designed to supply the place of the hand picking, now everywhere in use.

The principle of collecting the cotton from the seeds, as used in the cotton gin, is here applied to collect the cotton from the bolls, and to separate it from the leaves and stalks and other refuse matter of the plant.

In its general construction, the machine consists of an oblong frame on a pair of wheels, to be drawn by a horse or horses travelling between the rows, the wheels running astride one of the rows.

The machinery for collecting the cotton, is placed midway between the wheels, and receives the bolls of the plant as the machine moves forward. For this purpose a channel or passage is made from the front to the rear, through the middle of the machine, extending as high up as to the axle tree, and is floored over above it. This passage is wide at the front to take in the whole of the plant, and gradually narrows as we approach the axle tree, and from thence to the rear, the width is uniform.

In the anterior portion of this passage, the sides converging collect the cotton bolls together, where they are caught by the teeth of the pickers. On each of these sides is placed in the anterior or converging portion, a broad disk of a wheel, extending from near the ground to the upper part of the machine, having its disk covered with teeth like those of a saw, set obliquely and in one direction, which rotate with rapidity, and seize the bolls of the plant as they enter the passage, and tear out the cotton. Should any of the cotton escape the first set of pickers, there is a second pair near the rear of the machine, where it will be collected in the same manner as before described, except that the teeth in this case instead of being on the disk of a wheel, are placed on the periphery of a vertical cylinder, and carry the cotton around upon one side, where the fluted strippers clear it, and deposit it in a box. This machine as before mentioned, is the first of its kind presented to the office for a patent; it will of course be improved.

The practicability of this machine for taking the place of the present mode of picking cotton, considering that the machine must so tear to pieces the bolls, whether ripe or not so, that the cotton can never be picked but once, and how this can be reconciled with the present practice of picking two or three times, which is founded on the fact that only a part of the bolls ripen at a time, are questions to be settled by the cotton planter, and not by the office. Perhaps the first picking may be done as usual by hand, and the last by the machine, and thus the power picker when it shall be improved, subserve a valuable aid to the planter.

Grain Rakes.—Under this head have been granted five patents. Most of these are for minor points of improvement, which do not require any special notice.

One of these contains a device for the application of springs to the teeth, to enable them to ride over obstructions in the same manner as the spring teeth in cultivators and seed planters.

Threshers and Grain Separators.—Under this head have been granted nine patents. Four of these designed for separating grain from the straw, three for threshing only, one for threshing and grain separating, and one for a grain carrier.

These machines contain sufficient improvement to indicate general progress in the art, although there is no prominent feature that requires special notice.

Hulling Machines.—Under this head have been patented nine machines. Of these, three were designed especially for rice, two for buckwheat, one for clover and grain, and three for smut machines.

A patent has been granted for the use of vulcanized India rubber to cover the cylinder and the concave of cylindrical rice hullers. The form of the rubber in this case, is that of a conical cylinder, placed in the upright position, and the concave is made to conform to it. It is contended by the patentee that this material possesses peculiarities rendering it specially adapted to the business under consideration. The adhesive character of the rubber enabling it to hold fast to the hulls, while the rotation tears off the grain and carries it through the machine.

A second patent was granted for a modification of the caoutchouc rubbing surfaces on a horizontal cylinder, in which, if we suppose the cylinder divided into three sections, the rubber occupying one extremity, and less than one third, the brushes occupying the middle section, and more than a third, and the flannel surface occupying less than a third, at the opposite extremity, we have a general idea of the character of the invention.

The grain to be hulled is fed in at the rubber end of the cylinder, and by the arrangement of the rubbing surfaces, is carried forward between the cylinder and concave, to the opposite end, where it is delivered.

A patent for a smut machine has also been granted, containing a peculiar arrangement of screens above the mouth of the mill, in which the shoe shaken in the usual manner by the rotation of the vertical shaft of the beaters, separates on one side the materials larger than the grain, and those smaller than the grain, on the other side. A limited claim was granted for this feature.

Winnowing Machines.—No very prominent features in winnowing machines have been invented. But under this division have been granted nine patents, one of which is a re-issue.

A patent has been granted for a peculiar device in which the rubbing or friction surfaces are leather. The design of the machine is for clearing rat dung from wheat, by means of a soft or yielding surface, and not injure the grain.

Corn Shellers.—Seven patents have been granted, all for minor improvements which do not require any special notice.

Straw Cutters.—Five patents have been granted for different modifications of straw cutters.

One of these has some peculiarities worthy of notice, although the feature is not a very prominent one.

The straw is fed to the cutters, (both of which move against each other somewhat like a pair of shears,) by means of a rake, the head of which is moved by being connected with the cutter frame by means of cams and levers, the details of which could not be understood without drawings; the movements of the rake are as follows:

The head extending across the feed box, with its teeth projecting downward, is allowed to fall into the straw as the cutters open, and as they begin to close, a lever connected with the cutter frame pulls the rake, and consequently the straw towards, and a portion of it between the cutters, which last, as they come together, sever it. Feed rollers are not required, as the rake performs the part of a substitute.

Bee Hives.—Five patents have been granted, of which one is a re-issue.

In the construction of bee hives and the cultivation of bees, if we may judge from the English and American books of the present day, on that subject, it would appear that for many years we have learned little or nothing that is new in the character of this interesting class of animals. The English books written in the meantime, are little more than mere copies of each other, without adding much to our existing stock of knowledge. The information of our people whose knowledge is derived from such sources, must of course resemble its original. On the other hand, those who have not read books at all, but have confined themselves to their own apiaries, without even knowing what others beyond their contiguous neighbors have done, have generally groped in darkness, for the want of a little philosophy to guide them in their researches. Hence, it happens that in our Southern and Middle States, abounding in the bee-moth, inventors have exhausted their brains and their purses in inventing moth traps, all of which, in practice, have failed to accomplish the object. Instead of studying the character and habits of the bee, and of the moth in their different stages, and thus learning by experiment how far, and in what circumstances the bee is able to resist the encroachments of the moth, they have been satisfied with battling the full grown miller, with traps and gins, and luring signal lanterns, that have proved in all cases unsuccessful. Even if it be admitted that a trap secures the majority of the moths, a single one will deposite her hundreds of eggs, and thus introduce her progeny and defeat the whole aim and object of the traps.

Some twelve or fifteen patents have been granted for devices, or traps, to catch the bee-moth, and as many more applications rejected in the course of ten or twelve years, a space which covers the history of patent moth traps in this country.

It would be out of place for me to attempt writing an essay on the cultivation of bees. But when inventors are seeking remedies for defects in channels where it is known that the search must be unsuccessful, it is but proper that the attention should be turned out of a course so evidently wrong, that time and labor may no longer be wasted in unsuccessful efforts.

The moth or miller deposites her eggs in the crevices about the hive. She does not seek to enter where the bees are. It is obvious, therefore, that the first aim should be to prevent any crevices existing where eggs could be deposited, and the enemy allowed a place to harbor in. There is, perhaps, no application of science to the useful arts so much needed as in this very case. If the agriculturists of our country twelve years ago, instead of devoting twelve years to the invention of mere fly traps, had applied themselves to the study of the character and habits of the bee and the moth, they would, in this manner, have rendered these subjects as familiar as moth traps are now. But as it is, the mass of inventors have studied the devices of moth traps in their work shops, and have hardly enquired into the character of the animals to be caught.

What is most needed at the present time in the cultivation of the honey bees, so far as it regards the protection of these animals from the insects infesting the hives, is a good work giving an accurate account of all the insects which are known to infest bee-hives in the United States, their habits and peculiarities, the genus and species of each, the means they have of protecting themselves from the weapons of the bee, and under what circumstances the bee becomes overpowered by them. These facts and conditions, once clearly set forth, would enable the apiarian to construct bee-hives and apply his skill to some useful purpose.

Those who desire to know what is doing at the present day in other countries, will find that a large amount of information is poured forth from the German press, but unfortunately little of this is translated into our own language.

With regard to the history of the bee-moth, the reputed principal enemy of the bee in this latitude, I have been permitted to avail myself of the knowledge of a friend, who is a naturalist of note in our country, and who has devoted many years to the subject of Entomology, and whose remarks appended hereto are worthy of consideration:

"The natural duration of life in the honey-bee is about one year. The offspring of the first swarm will continue to occupy the same hive for an indefinite period, but they deteriorate in numbers and vigor, while those which occupy newer and cleaner hives are known to improve; attempts to recruit the old hive with other swarms, is like 'putting new wine into old bottles,' and seldom answers a good end.

"Many applications for patents are made for devices intended to prevent the separation of bees as their progeny increases, by enlarging the hive, but as each generation seeks to establish an independent household, any measure taken to prevent this natural course must be attended with disorder in the family. The parents in such cases will be hampered and the young dispirited; colateral hives appear to be the most successful. The natural proportion of the sexes and their progeny cannot be governed by the ingenuity of man

without danger to the regularity of succession; hence all the attempts to reduce the number of drones, or in other words, the male bees, must be regarded as prejudicial.

"The bee-moth, (Galleria cereana of Fabricius,) so much dreaded by apiarians, was first brought to this country by the early immigrants from Europe, with their bees. It varies so much in size and appearance that many names have been given to it, even by experienced entomologists. Thus even Linnæus named the male *Tortrix Cereana*, and the female *Tinea Mellonella*. Consequently it will be seen that all the moth traps predicated to be good, upon their size being such as to admit and detain the moths, and not the bees, can be of little avail.

"Two broods of the moth appear in the course of the year, one being in the perfect or moth state in April, and the other in August; hence to guard against their depredations, the hives should be guarded most carefully in those months. The dread of these insects is, however, greater than they deserve, their injuries being more imaginary than real. The larvæ of the moths feed principally on old combs which have been long in use, and in old hives where the bees are few and weak, consequently if the bees are in a healthy condition, with proper accommodation, little food or room will be left for the larvæ of the moths, their injuries arising rather from the weak and inefficient state of the bees—being an effect, not a cause."

Miscellaneous of Agriculture.—Under this head have been granted two patents for slight improvements in the construction of ox-yokes, and two others for modifications of curry combs, none of which require further notice.

CHEMISTRY.

Under this head forty-four patents have been issued, embraced in twenty-nine different subjects, as follows:

Manufacture of sugar,	5
Compounds for lubricating machinery,	3
Manufacture of pearlash,	1
Composition of matter for kindling fires,	1
Process of gilding on metals,	1
Process of manufacturing paper veneer,	1
Printer's ink, substituting rosin oil for linseed oil,	1
Mineral compost manure,	1
Dyeing compound and process,	2
Distilling liquors,	3
Distilling sea water,	1
Manufacture of Paris green,	1
Tanning by electricity,	1
Beer-fountain,	1
Alloys for different purposes,	4
Bread-making, composition for,	1
Preparation of oak-wood extract to be used in the manufacture of beer,	1
Process of preparing metallic patterns for casting,	1
Composition in imitation of marble,	1
Process of salting meat by rotatory movement,	1
Process of hardening metals by currents under water,	1
Manufacture of Indian rubber, 2 re-issues, 1 issue,	3
Manufacture of illuminating gas,	2
Process of glazing pottery,	1
Bottle fastening,	1
Hemp-rotting apparatus and process,	1
Coating iron with copper,	1
Curing tobacco,	1
Candle moulds,	1

Besides the above subjects of letters patent, two other applications have been presented and the claims decided on, but not in time to be issued in 1849. As one of these has been already published, and the other ordered to issue, it is deemed proper to include them in this report.

The former of these is for the use of a new material and a new process in the manufacture of sugar by a distinguished professor in a foreign university; and the latter is for the use of a new process in the preparation of animal matter for preservation or for a manure, by a no less distinguished professor of our own country.

The first named subject under the class of chemistry is the manufacture of sugar; an article indispensable to the wants of man, and the manufacture of which has risen to a high degree of perfection, both in our own Southern States, and in some of the islands of the West Indies.

Two of the patents granted under this head are for slight modifications of the sugar pan, on patents before granted to the same individual, and require no particular notice; one is for draining sugar in the cask in which it is sent to the market, and one for a modification of "blow up" pipes, for clarifying; neither of these requires any further remark, as they are for slight improvements.

The remaining patent granted on this subject is for the use of salts of lead in defecating cane juice, and precipitating the lead by means of sulphurous acid, which combining with the oxide of lead, forms an insoluble sulphite which is precipitated, and this is easily removed from the saccharine matter, carrying down with it the various feculencies contained in the sugar cane.

This material is designed to be used as a substitute for the albuminous matter usually employed for clarifying in refining sugars.

The use of salts of lead in defecating syrups is not new, but the use of sulphurous acid for separating the lead from the saccharine liquor, it is believed had not been hitherto known in the art of sugar manufacturing. A patent has been obtained in England, and one on the continent.

But by far the most important improvement that has been announced among the applications examined at my desk, is the use of a salt not hitherto employed in this manufacture for defecating cane juice, which salt, after performing the office of a defecator, by continuing the heat, becomes insoluble, and falls to the bottom without the addition of any other material whatever.

The salt here referred to is the acid sulphite of lime, or what is preferred by the inventor, the bi-sulphite of lime, which is soluble in water, and in saccharine solutions, but which, by continuous ebullition, becomes converted into sulphate of lime, or plaster of paris, which is insoluble, and is thus easily removed from the liquids containing it. The sulphurous acid exposed to air or oxygen, has a tendency constantly to take up more oxygen, and thus becomes sulphuric acid; but the lime being present, prevents the action peculiar to

acids on the cane sugar, and thus the condition of the sugar is preserved for an indefinite length of time, without change.

This power of preventing fermentation possessed by the salt in question, enables the manufacturer to take all the time necessary to perform the evaporation of the saccharine liquors, and at the same time prevents the formation of molasses. It is plain, therefore, what part of this branch of industry is effected by the discovery under consideration. When used on the plantation, it will save a good priced sugar for the planter, in place of the inferior qualities now furnished, also a good quality of sugar, in place of the molasses now furnished. Besides, it is well known to the sugar planter that the most successful manufacturer removes, by the rollers, from the cane, only two-thirds of the sugar contained in it. The remainder, under the usual methods of working, being not worth the labor and expense of separating. But with the improvement here contemplated, ample time, and sure means of preventing decomposition, will enable the planter to remove the remainder of sugar from the begasse, by means of water and an extra rolling. As this invention and discovery is one of great importance, which must powerfully affect the sugar planting interest of our Southern States, and that of the West India Islands, diminishing very much the amount of inferior sugars and of molasses in our markets, and as the discovery is not one of accident or chance, as often happens, I think it not only justifiable, but very desirable, to present so much of the history of the discovery and its application to the useful arts, as appertains to the manufacture of cane sugar, as nearly as may be, in the words of the author.

"Every one knows with what rapidity the juice of sugar cane changes character in warm climates where it is made; and, although this alteration is less rapid in the juice of beets, it is sufficient to create difficulty, and every means has been tried, to make the manufacture as rapid as possible, in order to avoid this cause of trouble and loss.

"For the chemist who makes an analysis, the problem of the extraction of sugar is solved by the use of alcohol. He by this agent separates the saccharine matter from the fermenting substances, and destroys the latter without injuring the former, thus preserving the sugar from any destructive influence. But for a large operation, it is necessary that the agent should be cheap and easily managed. Alcohol is dear; its use requires the greatest precaution, and is very dangerous. Setting aside then, alcohol, is it impossible for chemistry to produce a liquid which has the properties essential for this case, and which, like alcohol, will prevent all fermentation, even when exposed to the air? I think not. I do not even pretend to say that the system which, after many trials, I have considered the best yet known, is either the only one, or better than any other.

"In the sugar cane or beet, there is saccharine matter dissolved in water, nevertheless, this matter rests in that form a long time without change. If we could then make use of water as a solvent, in the same manner that nature does, we should extract the sugar without destroying its quality. The difficulties exist neither in the water nor the sugar, but in the air and in the fermenting matter contained in the cells formed by the tissue, which the contact of water puts in action. This being the case, is it possible to crush the cane, or grate the beet in a vacuum, and extract the juice, and boil it without removing it from this vacuum? If it is possible to do this on a large scale, the problem is solved. But this system seemed to me impracticable, and I have not tried it.

"It would appear easier to arrive at the desired result by operating with an inert gas, such as carbonic acid. To grate the beets in carbonic acid, to wash them in water charged with carbonic acid, and to water them upon the grater with water containing carbonate of lime, or carbonate of magnesia. My essays have not had the success I hoped.* The least trace of air is sufficient, and these agents do not seem entirely to annul its effects. Their action is therefore uncertain.

"I will mention here (only by way of observation,) a class of bodies to which recourse is often had to prevent fermentation. These are the metallic oxides, capable of combining with the fermenting matters, or the substances from which they are produced, and forming insoluble compositions. The oxide of mercury and the oxide of lead are in this category. For an analysis in the laboratory, the sub-acetate of lead may be easily and certainly employed, for it precipitates the fermenting substances, and everything capable of producing them, and leaves the sugar dissolved. But the unhappy consequences of employing it are too easily to be seen, and have been but too certainly realized every time it has been used in the manufacture of sugar, to permit me to believe in the possibility of using it.

"The action of tanin and monohydrated phosphoric acid is different. These two agents coagulate the fermenting substances, precipitate the matters that form them, and purify without heat, the juice of either sugar cane or beets in a manner that renders their application possible.

"I thought that I should approach the discovery I sought for, in trying—

"First. To prevent fermentation during the extraction of the juice, and to avoid the contact of the air while the juice was cold.

"Second. To profit by the coagulation of the fermenting substances, caused by heat, to carry them off, as is practised in defecation.

"For this purpose, I sought a substance having a great affinity for oxygen, without action on the saccharine matter, or danger to man, cheap, easy to produce any where, or to transport.

"Three substances particularly fixed my attention; the bin-oxide of azote, sulphurous acid, and aldehyde. This remarkable class of compositions, having a great affinity for oxygen, and which contain already two equivalents of this body, and absorb a third with facility, to produce acids, appeared to me eminently proper to fulfil one of the conditions mentioned, viz: to prevent by their presence the oxygen of the air from acting in producing fermentation.

"I have no doubt but that some one more capable than myself, will ultimately succeed in giving a practical form to the bin-oxide of azote, for I cannot believe but that a substance which destroys instantly oxygen, and forms with it an acid proper to precipitate the fermenting matters, will be one day employed in the extraction of sugar. Dissolved in the sulphate of iron, it would guaranty the juice from all alteration, until the end of the defecation by lime, and this accomplished, the juice would retain scarcely a trace of the reagents employed.

"Aldehyde, or the organic substances which resemble it, are too dear. I therefore made no stop at them.

"During all the experiments which I slightly mention, I found myself always inclined to return to the use of sulphurous acid. Its efficacy as an obstacle to fermentation, is so well proved, its price is so low, its production so easy, and the substances necessary to produce it so universal. It is true that sulphurous acid, which was so successful in the hands of Proust when used to prevent fermentation in the saccharine matter of grapes, has always presented

when applied to the manufacture of beet sugar, insurmountable objections. I was not ignorant either, that the most experienced persons had failed in the attempt to use it. Nothing practical had resulted from their efforts.

"If sulphurous acid can be profitably used where the must of grapes is concerned, if in preventing fermentation, it has no influence on the sugar, it is because it possesses at once, these two properties either of itself, or because it is converted into sulphuric acid by the action of the air. Every one knows, on the contrary, that the cane sugar is changed, and takes the nature of grape sugar, when placed in contact with acids, particularly with sulphuric acid. Thus, however inoffensive the sulphurous acid is when applied to the must of grapes, it is impossible to use it for the juice of the sugar cane or the beet; for as soon as the air absorbed by the sulphurous acid changes it into sulphuric acid, the effect of this last, on the juices mentioned, changes them into grape sugar. Reflecting on this difficulty, I asked myself if sulphurous acid used with a powerful base, such as potash, soda, or lime, would still present this obstacle. I found, in reality, that the base absorbing the sulphuric acid as soon as formed, left the sugar intact. From this point I was led to make many experiments, easy to reproduce, useless to repeat in detail, and which I will sum up in a few words.

"Dissolved sulphurous acid, added to a solution of the juice of sugar cane or beets, prevents fermentation, but destroys slowly the sugar, if left cold in contact with the air. If heated the destruction is much more rapid.

"The neutral sulphites of potash, of soda, and of lime, do not prevent fermentation; but do not injure the sugar, whether cold or warm. Neither of these products then, would serve.

"The acid sulphites, and more especially the sulphite of lime, presented, on the contrary, properties worthy of interest.

"Sulphurous acid in excess, prevents all fermentation. The base which all these salts contain neutralizes the sulphuric acid as fast as it is formed. It remains to be seen if by themselves, or by their excess of sulphurous acid, they have or not the power to convert cane sugar into grape sugar.

"I have heated for several hours small quantities of sugar candy, dissolved in water, with a large quantity of bisulphite of lime. The sugar was changed. It became uncrystallizable and deliquescent. The syrup thus formed presented sometimes an appearance with which manufacturers of sugar are well acquainted. Submitted to the action of heat for evaporation, it remained motionless. There was therefore the proper quantity to find out, and much care to be taken; but as it takes a great deal of the bisulphite of lime to destroy fermentation, I thought this agent worthy of a closer examination.

"Sugar candy in cold water, charged with bisulphite of lime, even in excess, crystallizes without loss, and without change, by spontaneous evaporation, at a very low heat. It is therefore, possible to manufacture sugar without artificial heat. Further on the importance of this remark will be made manifest.

"Perfectly white sugar candy being dissolved in ten times its weight of water, I added half its weight of a solution of bisulphite of lime, marking ten degrees of the areometer of Baumé, and boiled it for about an hour. It was then filtered, to clear it of the neutral sulphate which was deposited. It was afterwards put into a plate, where it crystallized entirely without a trace of molasses, leaving precipitated, however, a small quantity of the tartrate of copper, which had been dissolved in the potash.

"Straw colored sugar candy treated in the same way, gives the same result, only that the crystals are lighter colored than the candy itself.

"The same experiment with all kinds of sugar produced the same results, whether the liquid when evaporated was left acid, or had been carefully neutralized after boiling. I found also, that the crystallization was as perfect and rapid when the liquid was left unfiltered, as when it was filtered before the evaporation.

"I have examined with a polarizing apparatus, following the method of Mr. Clerget, the sugars that were produced by these different treatments, and I found—

"First. That the crystallized masses gave a direct notation, almost identical with that given after the inversion. The differences sometimes in one sense, sometimes in another, and confounding themselves with the errors of observation, proved that the sugar was not transformed, or that this transformation was practically insignificant.

"Second. That portions of the liquids taken at different stages, before the crystallization was complete, presented to the eye all the qualities of cane sugar, and deviated to the right of the plane of polarization, and gave a direct notation almost identical with that observed after the inversion.

"It results from this, that either after crystallization, or in the syrup before crystallization takes place, no difference is to be found between the sugar dissolved in pure water, and that which has been submitted to the action of the bisulphite of lime, when the excess is not too great of the bisulphite, or the heat too long continued.

"It was then reasonable to suppose that the bisulphite of lime, used as a substance, having a great affinity for oxygen, and as an antiseptic, would have no injurious effect on the sugar, if it was poured cold upon the beet grater, or the sugar cane mill, in such a manner as to mix with the juice, the instant the cells which contain it were broken. It was also to be supposed that it would endure the heat necessary for clarifying without injury. In this operation, judging from experience, the lime employed would neutralize the sulphurous acid, leaving the juice purified from the fermenting matters, and prepared for evaporation, without loss of sugar. But I soon found that the bisulphite of lime possessed certain qualities which demanded further attention.

"White of egg, blood, the yolk of the egg in emulsion, milk mixed with water, when mingled with the bisulphite of lime, and entirely coagulated at a temperature of 100°, (centigrade:) These liquids filtered and subjected to evaporation, leave residuums, in which are found a small quantity of azotised matters, mixed with sugar of milk, or the salts of these substances.

"To its antiseptic qualities, and its faculty for absorbing oxygen, the bisulphite of lime joins very great powers of clarification. This gave me the idea of the following experiments:

"I mixed 50 grammes of sugar candy, 250 centimetres cubes of milk,* 250 centimetres cubes of water, and 50 centimetres cubes of a solution of bisulphite of lime, at 10° of the areometer of Baumé. I boiled and filtered to separate the parts that were coagulated. The concentrated liquid gave a mass perfectly crystallized, which examined without drying or purifying, gave 92 per cent. of sugar, by direct notation, and 93.5 after inversion by chlorohydric acid.

"The defecation was easy and complete. The sugar was preserved intact. The water adhering to the crystals, and the salt of milk found in the mass, explain why there was only 92 per cent. of sugar in the 100.

"I employed in another experiment 50 grammes of sugar candy, half of an

*Cubic centimetres.

egg, white and yolk mixed, 25 centimetres cubes of milk, 75 centimetres cubes of solution of bisulphite of lime, and 450 centimetres cubes of water. This mixture boiled and filtered, gave a liquid which crystallized without molasses. The polarizing apparatus gave 85 per cent. of sugar by direct notation, and 86 after the inversion. There was then only the cane sugar, and 13.100 composed of hygrometric water, the excess of the bisulphite of lime, the salts of milk, &c.

"The bisulphite of lime at 100° (centigrade,) acts as a defecator. It separates the albumen, the caseum, and as will be seen hereafter the azotised matters analogous, which exist naturally in the cane and the beet. This separation is effected without loss or change in the sugar, except that which may be estimated at 2.100 of the mass, of which no account can be taken in experiments of this nature.

"It remains at present to be seen what part the bisulphite plays in preventing the colorization of the syrup.

"The coloring matter of cane or beet syrup comes from four principal causes:—

"First. The substances containing the coloring matters which are dissolved in the juice.

"Second. The contact of the air and the pulp creates rapidly coloring matters, which are added to the preceding.

"Third. The heat employed in the evaporation in changing the character of part of the sugar, and the other substances connected with it, forms also coloring matter.

"Fourth. The air, the lime, and the ammonia, aided by heat, give rise, during the evaporation of the juice, alkalized by the lime, to coloring matter.

"The bisulphite of lime carries away, almost immediately, the coloring matter which exists in the cane and the beet. It prevents the formation of others during the process of manufacture, and especially of those which require to form them, the action of the air and a free alkali. The bleaching power of the bisulphite of lime, with regard to the original coloring matters contained in the cane and the beet, is not absolute. It appears to act by a colorless combination which is formed between these substances and the sulphurous acid. This effect is well known to chemists. When there is a sufficient quantity of green matter to be seen in the stems or roots treated, we frequently see the syrup, after losing its color under the action of the bisulphite, become slightly tinged again as it concentrates, and again colorless when longer subjected to heat.

"In preventing the coloring of the pulp the bisulphite of lime is wonderfully efficacious, and so durable that too much cannot be said of its power. I have kept for six months, in badly covered vessels, the pulp of beets, which remained colorless from the effect of the bisulphite, when it is well known that under ordinary circumstances, they would have become very brown from the action of the air.

"I do not hesitate to say that there are many cases where the bisulphite might be most efficaciously employed to prevent the formation of coloring matter, which gives so much trouble to destroy when once formed; such as those that stain the filaments of hemp or of flax, after steeping, and indigo after it is precipitated, bark juice employed in tanning, the extracts of certain dye woods, &c. But all these points will be examined hereafter. For the moment I content myself with the statement I made above, that coloring matters that are spontaneously produced without heat in the pulp exposed to the air, never make their appearance when the bisulphite of lime is used.

"I will add that the evaporation without artificial heat: 1st, of a liquid formed by dissolving in water cane sugar; 2d, of cane syrup, and 3d, of beet juice, there will be no color where the bisulphite is used, and that where artificial heat is used for evaporation the coloring is scarcely perceptible. Nay, more, that the sugar obtained by this process from red beets, is completely colorless.

"I have never observed perceptible discoloration, except in rare instances, and even then it was so slight as to be of no consequence in the manufacturing of a large quantity.

"It is thus proved that the bisulphite of lime may be used with success in the extraction of sugar from cane or beets:

"First. As a powerful antiseptic, preventing the production or action of fermenting matter.

"Second. As, from its affinity for oxygen, capable of preventing the changes which the presence of that agent causes in the juice.

"Third. As an agent which at 100° (centigrade) defecates the juice, and removes from it all the albumen and coagulated matter.*

"Fourth. As carrying away the pre-existing discoloration.

"Fifth. As an agent capable, in the highest degree, of preventing the formation of coloring matters.

"Sixth. As capable of neutralizing all the hurtful acids which may exist or be formed in the juice, substituting for them an acid almost inert, (sulphurous acid.)

"It remains to be seen under what form or in what quantity the bisulphite of lime should be applied to the cane or beets; what new facts may be discovered in manufacturing a large quantity; and what inconveniences may overbalance the advantages it seems to offer. This is what I now intend to examine, arguing from my own experience, without exaggeration, but also without timidity.

"One of the thoughts which has the most sustained and excited me in the course of my researches, was the hope that, in the equatorial regions at least, sugar might be extracted by the heat of the sun alone. What would prevent that, once preserved from change, the juice of the sugar cane should be abandoned to slow crystallization in the open air, like salt in the salt marshes? I should say there was no obstacle, and I call to witness all those who have seen my experiments. They have all been of the same opinion. This opinion and this desire will explain why the experiments I am going to state have received the direction I have given them.

"It is well known that there exists in Murcia manufactories for making sugar from cane. They have resisted all the vicissitudes that the commerce of sugar has experienced for sixty years, and are still in full activity. It is from these manufactories that a friend procured me some hundred pounds of fresh sugar canes for my experiments.

"They reached the laboratory of the Sorbonne, in Paris, where I made my experiments, in a good state. They were pronounced by persons who had been in the colonies, and were acquainted with the subject, to have been im-

* There remains, however, after this clarification, a matter which is colored by the air, or the influence of an alkali, first violet and afterwards brown. It is probable that it is an azotized substance.

perfectly ripened. A good many were worm-eaten. My experiments, then, from such materials, could not be expected to be very satisfactory; nevertheless, the first essay I made filled with astonishment persons accustomed to the manufacturing of sugar, and capable of judging the results obtained.

"The juice was extracted by a coarse grater, adding bisulphite of lime during the operation. It was clarified by boiling, and simply filtered through a cloth strainer. The concentrated syrup was filtered a second time, and left to crystallize slowly. This it did to almost perfect dryness. An analysis by by alcohol could have given nothing better, either in quantity or quality. It was even more colorless than sugar obtained by alcohol.

"In these experiments all the sugar contained in the juice took a solid and crystallized form. The crystals were large and firm. They were not more colored than ordinary sugar-candy, which they resembled in appearance. The traces of molasses were almost imperceptible.

"Taking into consideration the almost entire purity of the juice of the sugar cane, which really once clarified, is only sugar and water, and considering also the aptitude which cane sugar has to form large crystals, in which quality it is far superior to beet sugar, I am sure that the first colonist who attempts to evaporate slowly a quantity of syrup will perceive that the crystals, in size, color and appearance, are so superior that the advantages of the process will be entirely evident to his mind.

"I changed the proportions of the bisulphite of lime; I experimented separately on the ripest canes, on the greenest, and on the worm-eaten, and in all my essays the result was the production of crystallized sugar. I never found a spoonful of molasses that could not be crystallized.

"The analysis of the juice and the action of the bisulphite on it were always the same, both as regards the substances contained and the quantity of sugar obtained.

"The operation is so simple and so correct in its results that it appears almost necessary to do wrong expressly in order to fail to extract all the juice from the sugar cane.

"Every one knows that the juice extracted from the sugar cane is sometimes not more than the half, never more than two-thirds of the quantity really contained in the cane. There remains, then, in the crushed cane at least a third of the saccharine matter. To extract this by washing, in warm climates, is impossible, on account of the rapidity with which fermentation takes place; but if the bisulphite of lime is mixed in the water used in washing, nothing is easier. There is no need for hurry; and the washing may be so perfect as to extract the last particle of sugar.

"Thus obtained, these washings would be nearly as rich as the juice itself. Treated in the same manner, by defecation, at 100° (centigrade), simple filtration and concentration into syrup, and then slow evaporation, they would give the same results as the juice.

"I tried, with the crushed cane, this method with a lively curiosity, and I succeeded in producing large crystals of pure sugar and much superior in color to the best sugar sent us from the colonies.

"Even more, and that for reasons that chemists had already discovered, the skimmings and the filters employed in filtration, after several days' exposure to the air, and the danger of fermentation, yielded pure crystallized sugar. It was only necessary to wash all these substances in water charged with the bisulphite of lime, and evaporate this water.

"Thus the bisulphite of lime rendered the sugar almost as unalterable as mineral salt; that of the juice, the crushed cane, the scum, and the filters, produced the same large grains of a colorless or slightly yellow candy. All this requires neither care nor study, and nothing renders hurry necessary. As long as the bisulphite exists in the smallest appreciable quantity in the liquid it prevents all alteration.

"I know nothing of the colonies, and it would not, therefore, become me to pronounce if the employment of such a process would or would not have the effect of producing division of property, by enabling the negroes who inhabit them to extract the sugar profitably on a small scale; but I do not hesitate to say that my essays proved that this change in the cultivation and in property is possible.

"It may be objected that powerful mills are necessary to crush the cane. This is not so. A root-cutter and a grater are all that is necessary; because the washing is so complete by the employment of the bisulphite of lime, that all the juice may be extracted in that way from the cane, cut or torn in the rudest manner. However that may be, I will now give the method I arrived at, treating the canes which I had sent to me:

"1. I broke up the canes by means of a beet-grater, watering the pulp during the operation with a solution of the bisulphite of lime. I then pressed out the juice, which was boiled, filtered, and evaporated by fire to the density of about one-third what the cold syrup should be, filtered again, and left to slow crystallization. This gave me in a few days a mass of candy, from which it was impossible to extract any molasses.

"2. The crushed cane or pulp, whichever it may be called, was wet with water, submitted to another pressure, which produced another juice less rich. This, treated like the first, gave the same results.

"3. I repeated again this last operation.

"For all these experiments I employed one per cent. of the weight of the cane of a solution of the bisulphite of lime, at 10° areometer Baumé. I took out the whole of the sugar, and found all of it in a solid form. My operations, though evidently susceptible of being applied to manufacturing on a large scale, presented at the same time a perfect analysis of sugar cane.

"If experienced chemists, who, like Mr. Caraseca, in Havana, and Mr. Arequin, in Louisiana, are in reach of sugar manufactories, will repeat my experiments on a larger scale, I am sure their opinion will be soon formed.

"I will now mention the objection to my process. The sugar obtained by it has a taste of sulphur, but it loses this in three manners:

"1. Crushed and exposed to the air, the sulphite becomes neutral sulphate.*

"2. Exposed to an ammoniacal atmosphere, the sugar loses its sulphurous flavor, and often takes a taste of vanilla very agreeable; but it is sometimes slightly colored.

"3. Clayed, so as to lose about ten per cent. of its weight, it gives a sugar equal to the purest and whitest sugars of commerce.

"The syrup used in claying may be regenerated by evaporation, and gives crystals similar to the others. For manufacturing I recommend the third process.

* As crystallized sugar does not contain solid bisulphite, but only neutral sulphite, this can only give neutral sulphate. If the sugar is acid, this acidity is derived from the acid phosphate of lime formed by the action of sulphurous acid and the phosphate of lime in the juice.

"I will only, for the moment, slightly mention a circumstance that may cause difficulty. The sulphates and the sulphites are changed by the contact of organic matter into sulphurets. The formation of sulphurets, and the appearance of free sulphur, which would probably be the consequence, are not presented in any of the numerous specimens which I possess, and of which some of beet sugar are already quite old.

"I recapitulate: 100 kilogrammes of cane contain about 18 kilogrammes of sugar, when in good condition. They yield 60 kilogrammes of juice when well managed, and this gives 12 kilogrammes of sugar.

"There is usually extracted from the juice from 6 to 7 kilogrammes of unrefined sugar; there is, therefore, a loss of 5 or 6 kilogrammes in the operation; besides which 6 kilogrammes are left in the crushed cane.

"It results from this, that by applying the new process to the juice alone, 12 kilogrammes of refined sugar will be obtained, in place of 6 or 7 kilogrammes of unrefined sugar. If the crushed canes are also submitted to this process, 17 or 18 kilogrammes of sugar will be obtained from 100 kilogrammes of cane; that is to say, the whole amount of saccharine matter contained in the cane may be extracted. In saying, therefore, that the yield of sugar from cane might be doubled, I stated nothing in which my experiments did not bear me out, and certainly was far from exaggerating.

"The future will decide. I await its judgment with the most perfect confidence. The bisulphite of lime will enable the manufacturer to do all which the chemist can do with alcohol; and if the latter extracts 18 kilogrammes, the former will also do the same one of these days.

"Whether the evaporation should be carried on to the end by boiling; whether the syrup should be concentrated one-third and finished in the drying room; or whether the evaporation should be entirely carried on in cases exposed to the sun, is more than I am able to decide. Local circumstances and studies on the spot will determine this. I will only remark that the use of the bisulphite, by preventing fermentation, renders the use of large shallow cases or reservoirs of wood easy, and permits even rooms of graduated heat for drying.

"I did not have at my disposal a sufficient quantity of juice to try these different methods, but I desire to show that they are worthy of essay; and I recommend to the attention of Mr. Casaseca, or any other chemist in a favorable position for trying it, the following experiment:

"I took beet juice, to which I added four per cent. of the normal solution of bisulphite of lime. Having clarified it, I put it into a pine case, which I had previously washed well with the bisulphite. The bottom was pierced with holes, each of which had a string passed through it, which hung down, and thus afforded numerous means for the juice to run off, and a large surface for evaporation. As fast as the juice was collected in a vase placed under the strings, it was poured over again, and thus concentrated by passing several times; the syrup was placed in a flat vessel, where it crystallized almost entirely. In the little molasses which was separated from the crystals new crystals were formed, and these last were as perfectly characterized as the first.

"If, with beet juice and an imperfect apparatus, this experiment succeeded, why should it not with cane juice, which is purer and richer, in hotter countries, in the open air, and with a more carefully arranged apparatus? Why not seek in the heat of the sun, where it is so intense and so certain, the means of replacing coal and other combustibles which are not to be had?

"Whatever may be the means of evaporation which experience may prove to be the best, the striking results obtained in operating on a few hundred pounds of cane, has convinced me that the extraction of sugar in the colonies will hereafter follow new and more profitable methods. The juice and crushed cane being placed out of the reach of fermentation, I was, therefore, fully disposed to take immediately, the measures necessary to ensure a prompt essay of my system. This I hope to do (with the aid of Mr. de Tracy, Minister of the Marine in France, who has shown me much kindness,) either in the French colonies or in Algiers, where many well-informed persons think that the sugar cane would succeed perfectly, and where the greater quantity of sugar given by my method, would enable them to produce, at a low price, sugar which, from its favorable position, would command the market of the Mediterranean."

Paper Veneering.—A process of covering plain furniture, trunks, boxes, &c., has been patented, by which common and cheap woods, and cheap work may be covered by a prepared paper stained of the proper tint, for mahogany and other kinds of wood desired to be imitated. The veneer is then to be well varnished.

The advantages of the invention are, that it is cheap, easily prepared, and can be readily repaired if defaced. It also gives a fine finish to a common and plain piece of work.

Lubricating Compounds.—Three patents have been granted for compounds designed to diminish friction in running gear, as applicable to axles of railroad cars, and other machinery.

One of these is for a process of preparing the composition, and the other two for the ingredients used. The ostensible object in most of the compounds used for these purposes, is to obtain a material that will not melt, except as the machinery becomes heated by the friction, and then even, that it may have sufficient absorptive substance to hold in contact with the friction surface, a sufficient quantity of the lubricating material, rendered fluid by the heat. The absorptive materials used, are plumbago, french chalk, magnesia, soapstone, clayey matters, &c.

Manufacture of Pearlash.—This is claimed as an improved process, on the ground that the inventor, by first roasting the ashes, and thus burning out all the combustible matter usually found mingled with them, such as bits of wood and charcoal, he then makes one solution and one evaporation, and the work is done.

Printer's Ink.—An application for the composition of a printing ink has been admitted to be the proper subject of letters patent, but in consequence of a legal question arising out of an interference between two inventors, the patent could not be issued till after the close of the year, still, as the invention is regarded as an important one, some account of it is deemed proper in this place.

Linseed oil and lampblack are the well known ingredients of printer's ink, and the preparation is necessarily attended with a tedious, disagreeable, and dangerous process of boiling and burning, in order to give the ink the peculiar tenacity required.

The invention here set forth consists in the introduction of a new oil, not before used for such purposes, and thus modifying the process, so as to obtain an ink of superior quality, without the dangerous process of burning.

Considering the large amount of this material used at the present day, and the comparative cost of the two oils, (the expense of the linseed being four times that of the rosin oil,) this invention assumes an importance in the im-

provements of the day, not usually met with. It is also stated that the introduction of this oil enables the printer to print with delicate and fancy colors, which cannot be done with ink manufactured from linseed oil.

The oil here referred to, and called *rosin oil*, is obtained by the destructive distillation of common rosin. The process was patented some five or six years ago, by W. T. Clough. This oil is extensively used in paints, and has been recently introduced for the manufacture of illuminating gas. It is this oil which furnishes the gas to light our streets, houses, and the public buildings of this city.

Distilling Liquors.—Although three patents have been granted under this head, only one of them requires any special remarks. This consists in an arrangement of a still of ordinary construction, so that by the enlarging and elevating of the head into a cylinder, a series, or several tiers of cups or pan shaped vessels, capable of containing charcoal or other purifying materials, may be placed one above another, within the cylinder. These purifying pans are pierced with holes in their bottoms for admitting through them the impure spirituous material, which is purified by passing through the charcoal contained therein, and it is converted into pure spirits by the single operation. There are other details of minor importance about the apparatus, which need not be named here.

A process of preparing Metal Patterns for Casting.—A process has been patented for reducing and working into the desired shape and form iron castings to be used as patterns for moulding for other castings. It consists in acting upon the cast metal with dilute oil of vitriol, until the metal of the exterior parts is nearly all dissolved out, and thus presenting a substance chiefly plumbago, easily worked with tools, and which may be planed and worked into the proper shape, while the internal parts retain a sufficiency of metal to give strength to the whole.

A process of coating Iron with Copper.—This consists mainly in the device for protecting the iron while it is being immersed in the melted copper.

The iron having been cleaned and prepared in the usual manner, with dilute oil of vitriol, is quickly dried and immersed in a thick cream of clay and water, and again quickly dried, and with the covering of clay upon it suddenly depressed in the bath of melted copper, by which the clay flies off, and the metals firmly combine. A coated iron plate is thus formed, that is susceptible of many and valuable purposes in the arts.

Curing the Stems of Tobacco.—This is a process by which an article hitherto regarded as a useless material, is made to subserve a valuable purpose. It consists mainly in digesting the article for a certain length of time, having previously mixed it very thoroughly with pulverized charcoal. Some other details of the process are necessary, which need not be here stated.

Process for Generating Illuminating Gas.—The peculiarity of this invention consists in the use of a mixture of charcoal and iron scraps, heated to bright redness in an iron retort, through which pass the gases generated by passing steam through red hot charcoal. It is proper to say that when steam is passed through highly heated charcoal, the oxygen of the water unites with a part of the carbon and forms carbonic oxide, while the hydrogen unites with more carbon and forms light carburetted hydrogen. Both of these gases are combustible, but neither furnishes any considerable illuminating power. But it is alleged by the inventor that when these gases, and especially the hydrogen, is brought into contact with carbon and iron at a red heat, the light carburetted hydrogen is converted into olefiant gas, or heavy carburetted hydrogen.

It is now about twenty years since apparatus was constructed for the preparation of illuminating gas, from decomposed water mixed with other hydrocarbons. The first attempt was by mingling spirits of turpentine with the gases derived from water at the burner. See the English patent of Michael Donovan, sealed 6th October, 1830.

The next step in the improvement consisted in the mixture of the gases from the decomposition of water, with volatile oils while on their way to the burner. The oils were thrown into the pipes in the state of vapor. This improvement made by Jean Baptiste Mollerat, was set forth by the inventor in a patent sealed in England 25th September, 1834.

The same gentleman made another modification of his apparatus, as shown in his second patent sealed May 2nd, 1837, in which it is stated that the gist of the invention consists in bringing the gases generated from steam into contact with the volatile products of oil at a high temperature.

In 1840 Count de Val Marino exhibited in England a further improvement in gas generators, a patent for which was sealed 22nd June, 1839.

It consisted of three cylindrical iron retorts, standing on end in a row in the furnace. In the first it was alleged that the steam was decomposed into carburetted hydrogen and carbonic oxide; in the 2nd the gases were more highly carbonized, and in the third, brought into contact with the volatile oils, when in the act of being converted into gases.

In the first retort are placed sufficient carbonaceous material to decompose the steam; in the second are contained pulverized charcoal and other carbonaceous matter, to more highly carbonize the gas; and in the third, fragments of coke or other carbonaceous matter, amongst which the gases from the second retort are received, and on which the oil or other gas making liquid is allowed to fall in drops or fine streams. Such was the state of progress in this department of the arts, when the invention now under consideration was presented for a patent in England, and was sealed April 15th, 1847.

Mr. Stephen White the patentee, also employed the three retorts used by Val Marino, but confined himself to the use of two for decomposing the steam and carbonizing the gases from it. In the first two he placed abundance of carbon, consisting of pulverized charcoal mixed up with scraps of iron or iron turnings, for the purpose of rendering the gas more highly charged with carbon. The substance of the invention in this case consists in adding the iron turnings to the carbon in the first two retorts.

The claim in the English patent above referred to covered many points not material to the main feature of the improvement, which consisted in the use of iron fragments contained in a colander placed in the middle of the retort, or the use of lime in place of the iron. In the American patent of Mr. White, granted January 22d, 1850, on the English patent sealed 26th March, 1849, the claim is based upon the use of the iron in combination with the carbon.

In reviewing the subject of the processes and materials for generating illuminating gas, where the elements of water are brought into contact with highly heated pulverized carbon, and as appears by the results made to absorb a considerable amount of carbon, so as to give them a luminous body, so to speak, there seems to be a great dearth of definite information. Nearly all the persons who have been engaged in improving the processes and the apparatus do not appear to understand the precise nature or the desiderata of their experiments. Mr. White says, in his specification of his English patent for 1847, that the effect of his iron plates, used with the carbon, is to absorb the carbonic acid gas generated in the gas evolved from steam. I have

recently repeated the experiments of Mr. White, and have been enabled to prove that no carbonic acid does or can exist where the elements of water, or where oxygen, or air, or carbonic acid are allowed to pass through or over pulverized carbon at a red heat; any of these elements, except the carburetted hydrogen, will be instantaneously converted into carbonic oxide.

From what has been done by my own and others' experiments, I have learned the following: that whenever light carburetted hydrogen, or pure hydrogen, or carbonic oxide gases, either separate or mixed with each other, are passed over highly heated pulverized charcoal, a great excess of carbon is taken up and rendered volatile and held in combination with the gases, communicating to them a considerable degree of illuminating power; but the quantity of carbon taken up depends on the degree of heat and on the surface of carbon presented, so that it is a difficult matter to so gauge the quantity of carbon taken up as to produce a uniform and equable light. It is found that when any of these gases has been charged to excess with carbon, if it be passed over or through iron chips or fragments heated to moderate redness, the metal will take up the excess of carbon, and yield a fair illuminating gas of a pretty uniform composition, and this, mingled with the ordinary oil or rosin gas, constitutes the basis of all the processes now before the public for water gas.

Mr. White used the carbon and the iron in the same retort; others use the materials in two different retorts, and force the gases first into the carbon retort and then into that containing iron.

Concentrated Animal Manure.—A patent with this title has been ordered to issue. But from delay in amendment of the claims it will not be published in the list of 1849. Its importance however, embodying as it is believed, facts and principles not hitherto generally known, demands some notice from your examiner.

To express a principal feature of the invention in few words; the inventor exposes the flesh of animals to the action of sulphuric acid of certain strength, by which it assumes a fixed state or condition in which it may be kept for any length of time, without undergoing any further change. In this state the animal matter may be preserved for transportation, for manure, or for manufacture of ammoniacal salts, as we shall see further on.

The inventor in his description says, "my invention has for its object the production of a concentrated manure, with nitrogen as an aliment, to be used as a substitute for guano.

"In the preparation, I make use of such organic substances as whenever employed for manures at all, have been attended with the production of much nauseous effluvia, and the loss of a great part of their substance by the escape of the gases envolved, and especially ammonia.

"Besides producing a valuable manure from the offals of slaughter houses, fisheries, manufactories for extracting oil from fish or flesh, &c., the invention is intended to convert to a useful application such animal matters as do not ordinarily constitute the food of man; as the flesh of horses, mules, dogs, rapaceous beasts, birds and fishes. The carcases of porpoises, sharks, dog-fish, white fish and many others, are frequently thrown upon land as manure, either before or after, the extraction of the oil. But this can only be done when the transportation is for a short distance only.

"For want of suitable means of preventing putrefaction and reducing the bulk and weight, to diminish expense of transportation, the use of the materials has been always confined to narrow limits. And the noxious and offensive gases which always accompanying decomposing animal matter renders such materials nuisances to the neighborhood where they are found.

"Highly nitrogenized vegetable matter may also be treated in the same manner, and used for the same purposes.

"*Process.*—Putrefiable organic matter containg nitrogen, are subjected to the action of concentrated sulphuric acid, or are mingled with various sulphates, nitrates or clorides, and especially the sulphates of iron, lime, soda or potash, or with the nitrates of potash or of soda. The proportions used are such as to keep the weight of the acid, whether free or combined, when compared with that of the animal matter, from one-fifth to one-tenth of the latter. The weight of acid, whether in a free or combined state, to that of the animal matter, is from one-fifth to one-tenth of the latter. The acid or salt, acting as an antiseptic, secures the animal matter from decomposition. If the acid be free, or be held to its base by feeble affinity, as in the sulphate of iron, it secures the azotous portion of the organic matter from being food for worms, or flying off with hydrogen in the state of ammonia.

"Among the antiseptics employed is a mixture of sulphuric acid and nitrate of soda, and dry tan or saw dust; the first two ingredients being allowed to react before the addition of the ligneous matter. Besides preventing or arresting putrefaction, another property is secured in the use of the acids, salts, &c., the fixing of the fertilizing products of the organic materials treated, even when subjected to the temperature required to evaporate the water. This property allows the materials to be quickly dried without injury, and to be reduced in weight and bulk, and made susceptible of transportation with moderate expense.

"If the manure is to be long kept, or transported to considerable distances, after treatment by acids, &c., as set forth, I subject the organic matter to a process of desiccation by means of a boiler, oven, drying room or kiln, to vaporize the water, which renders them lighter and friable, and thus presents to the public a material in a suitable state for sowing or spreading on land, like guano, or any pulverulent matter.

"In order to facilitate the union between the organic matter treated, and the acids and other agents employed, I use the acid in a concentrated state, in which the flesh, &c., is boiled. In this way the azote or nitrogen is arrested, and the aqueous particles escape.

"From this treatment of the materials a gelatinous mass is obtained, which is mingled with pulverulent matter either neutral, or it may be, an active fertilizer, according to circumstances, such as bone dust, ground plaster, spent bone-black, coal ashes, road dust, spent tan, powdered charcoal, &c.

"During the formation and mixing of pulverulent matter, while in the jelly or paste state, coal tar, wood tar or petroleum, pitch or rosin are added to correct fœtid effluvia, in case any should be evolved during the operation.

"When no actual putridity exists in the organic matter to be converted into manure, quick lime or lime that has been used in purifying coal gas, is sometimes used to effect the desiccation of such materials, and the mass is then formed into bricks or dumplings, for the purpose of convenience of transportation, and these may be pulverized or broken into fragments, for the purpose of distribution over the soil.

"But whenever putrefaction has commenced, the lime cannot be used, as by abstracting water it would cause the evolution of ammonia, and great loss of material be sustained.

"The inventor claims the use of mineral acids to act on the soft parts of

animals, or upon azotous vegetable matter, at temperatures varying according to circumstances, as herein set forth.

"Also the combination of the acids with the different salts, as described, to modify the action of the acids.

"Also the combination of the acids with wood, tar, &c., as set forth."

LEATHER.

On this subject have been granted twenty-one patents.

For Boots and Shoes	7
Tanning and Finishing Leather	5
Saddles and Harness	9

Boots and Shoes.—A patent has been granted under this head, for a combination of devices for cutting boot heels. It consists of an inclined plane or bed piece, and two curved cutters or chisels, for cutting the two symmetrical sides, and half of the back. The cutters work in guides with machinery to depress them, so that the heel or several lifts may be cut at a single depression of the chisels. The guides are so arranged that as the chisels descend they expand or separate and produce the expanding form of the heel, from the bottom upward.

A patent was also granted for a metallic spring boot heel of the usual contour and form. It consists of an outer case or ring of metal, and of a corresponding piece received within it, and easily sliding in and out; but when in its proper position, projecting beyond the case. It is sustained in its place by means of a spiral spring under the central portion of the cap. Perhaps a clearer idea may be obtained from the claim, which is, "making a metallic tread for the heels of boots and shoes, separate from, but secured within the casing of the heel, in such a manner that it shall be free to change its position, to accommodate itself to the inequalities of the surface of the ground, whereby it wears more evenly, and is less fatiguing to the foot than a rigid heel."

Tanning.—A patent has been granted for a modified process in tanning leather, which is specially applicable to light skins, but may be used in all kinds of tanning.

The gist of the invention consists first, in a modified process of unhairing the skins, by a composition of lime, potash and salt, by which the process is very much shortened; and secondly, by combining what is called the process of *plumping* with that of *tanning*. It is alleged by the patentee that the process of plumping, which consists in the use of acids, to open the pores of the skins, is like that of rising dough by yeast; namely, that after the pores have once been fairly opened, if the tanning process is not commenced immediately, they will soon begin to close; as dough once raised, if not transferred at the proper time to the oven to be baked, will fall, and an inferior bread will be the result.

The process of tanning therefore, as set forth by the inventor, consists in the combination of the plumping and the tanning process, so that as soon as the acids have acted to open the pores of the skins, the tanin present in the liquor, shall enter and perform its part in the operation.

Saddle and Harness.—A buckle designed for light service, as suspenders, has been patented. Every part of it is formed by dies, which strike it up from a plate of metal. The usual open parts are cut out, and the tongues, which are two or three, project forward to the cross bar, but do not lap upon it, for then they could not have been cut out of a single piece of metal.

After the first blow of the dies has been struck, the buckle is removed, and the points which are to form the tongue, are slipped under a second or finishing die, by which they are elongated at a single stroke, and the buckle is completed. Thus by two successive strokes of dies a buckle is formed.

HOUSEHOLD FURNITURE.

In this class there have been granted fifty-five patents, arranged in the following groups:

Washing machines	6
Cutters of meat and vegetables	7
Bedsteads and fastenings	19
Tables	6
Chairs	7
Brushes, &c.	4
Cream freezers	3
Bottle cleaners	1
Portable water-closet	1
Mosquito bar	1

Washing Machines.—In relation to this group of patents it is necessary only to say that the subject is so nearly exhausted that, so far as new devices for agitating the materials are concerned, there seems little room for invention. Every contrivance for creating friction seems to have been applied to these machines; the principles adapted to churning, fire engines, water wheels, fulling mills, rolling and smoothing grounds, rolling and smoothing shot, have been made to contribute to this necessary household operation. It is believed, however, that there is no striking feature in this group requiring special notice.

Cutters of Meat, &c.—This group embraces the different machines for preparing and stuffing sausages, paring, quartering and slicing apples, and cutting vegetables for feeding domestic animals.

A patent was granted for a small and very simple apparatus to grind the meat and simultaneously press it into the cases prepared to receive it, at a single operation.

The machine consists of a small conoid mill or vessel somewhat resembling a coffee mill, but lying on its side. It has a solid conoid piece or runner within, having a spirally-fluted surface, and corresponding projections on the concave portion, each designed for cutting and pushing forward to the apex of the cone the comminuted material. The hopper placed on the upper side of the cone receives the pieces of meat of suitable size. A crank is fitted to the extremity of the runner at the large end of the cone, and the body of the machine is made fast to a table and worked like a coffee mill. The case is slipped upon the tube of the small end of the cone, and as the crank is turned the meat is comminuted and pushed forward, and the case is slipped off from the tube as it is filled.

A machine has been patented for paring, coring, and slicing apples, at three several steps of the machine. The machine is in the main constructed like an ordinary paring machine; the apple is placed by hand upon a tridental fork, and against it rests the knife, which, as the machine is turned, moves forward from the stem towards the apex, without any external aid. At this end of the first step of the operation, in order that the knife may move back to the stem to take its place anew for another operation, a weight

on this side of the knife haft, which had been carried up a quadrant of a circle by a segment wheel meshing into a bevel wheel, (which last is on the driving wheel,) the said bevel wheel having a space bare of cogs, and as soon as the cogs of the segment wheel reach the bare space in the bevel wheel, the weight rotates through the quarter of the circle, and the knife is thus carried back to the base or stem of the apple. At this stage of the operation, a slide block, working in horizontal guides, carrying a tube of thin sheet metal, and which was placed opposite to and pointing towards the apex of the apple, is now pushed forward by a motion of the hand, and pierces the apple from the apex to the stem, thus taking out the core, and as the block returns to its first position, takes the apple from the fork; but before it reaches its position the apple strikes against a projection which releases it from the coring tube and allows it to fall upon the hopper-formed base of the machine, where it meets with a series of rotary horizontal knives, moved by gearing from the driving wheel, which knives cut the apple into pieces of uniform thickness suitable for drying.

Bedsteads and Fastenings.—Although nine patents have been granted for bedstead fastenings, scarcely any of them presents a radically new feature, and this part of the group will be passed over without further remark.

A portable cot-bedstead has been patented, designed to be used as a camp bedstead. It is of simple and cheap construction. It has the usual form of the cot-bedstead, but is so constructed as to have every joint severed in a few seconds, and the whole rolled into a compact roll, like a map or chart.

An iron bedstead, made to fold together with a kind of double joint, has been patented during the year. The joint is so constructed as to admit of the bedstead being folded together midway of the length of it; so that when folded it is converted into a clothes horse, and may stand close by the side of the room, or in a closet, when out of use.

The folding is performed thus: two joints, each with a link piece midway of the length of the side rails, admit of the middle of the bedstead being elevated to form the top of the stand. The head piece and the foot piece would, if practicable, rest flat upon the floor, but there is a joint both at the head and foot piece, which permits each part to fold down upon the outer surface of the bed; so that when the whole frame is folded together as a clothes horse, the four legs of the bedstead form the four legs of the clothes horse.

Tables.—A table called a self-waiting table has been patented. It is a round table, the outer portion of which is fixed, and is of sufficient width to accommodate the plates of individuals. The central portion is detached from the outer portion, and elevated a few inches above it, is moved by clock work, and made to rotate slowly, so as to bring every plate or dish on the central portion to each individual at every rotation of the table; and this is frequent enough to allow every one at the table to be amply served without the aid of a waiter.

A dining table for ships' cabins has also been patented during the year. It is constructed on the same general principle that the ship's compass is balanced in the binnacle. A pendulum weight is suspended by a rod from the leaves of the table, so that whenever the ship varies from the upright position, the pendulum, by its weight, tends to a vertical direction, and in the same proportion the table leaves tend to the horizontal direction.

Chairs.—An improved fan rocking chair has been patented during the year. It consists of an ordinary rocking chair, having a rod of metal or wood extending upward from each rear post considerably higher than the head, and thence bending forward, and at their extremities united by means of a cross bar above and a little anterior to the head. From the cross bar is suspended a curtain with a roller in the bottom, and heavy tassels at each corner. As the person rocks the chair the fan curtain moves and produces an agreeable and cooling effect about the head.

WEARING APPAREL.

In this class have been granted nine patents, under the following heads:

For Tailors' measure	1
Finishing buttons	1
Button making machine	1
Button mould machine	1
Manufacturing bandboxes	1
Machine for curling hat brims	1
Shaving brush	1
Hooks and eyes	1
Dress pin	1

A patent was granted for a shaving brush of the usual form, but containing within, and in the central part, a reservoir for a shaving cream, or semi-fluid soap, which is pressed out as needed by means of a piston governed by screw thread, and a thumb piece projecting out at the top.

Respectfully submitted,

L. D. GALE, *Examiner of Patents.*

Hon. THOMAS EWBANK, *Commissioner of Patents.*

Hon. THOMAS EWBANK, *Commissioner of Patents,*

SIR:—In compliance with your request, I have the honor to report, that on the 1st of January, 1850, the Patent Office contained fifteen thousand one hundred and seventeen models, which are classified as follows, viz:—

Of patents issued previous to December, 1836,	200
" " since " "	6,980
" " for designs	257
" " " additional improvements	92
Whole number of models in the office for patents granted	7,529
Number of models for applications suspended	642
" " " rejected	6,946
Total	15,117

It is to be regretted, that after a lapse of twelve years, but two hundred of the several thousand models burned, have been restored. This, however, cannot be attributed to any neglect upon the part of the Patent Office, but to the fact that previous to 1836, models were not required in all applications for patents made, and also to the failure in patentees to have duplicates made, for the payment of which, ample provision was made by act of Congress. The office should not relax its exertions in continuing to urge the necessity of their restoration, each year adding to the difficulty of their procurement.

The models belonging to patented cases are being classified and arranged,

as far as the inadequate rooms *now* appropriated for their exhibition will admit. Congress having granted the use of the upper part of the Patent Office building temporarily, to the National Institute, and the collection of the South Sea exploring expedition, deprives the office of the use of the room most appropriate for the reception of the models. Unless the collection above referred to be removed, the office will find itself much embarrassed for want of proper facilities for arranging the rapidly increasing number of models.

No provision is at present made for the proper exhibition of the models pertaining to rejected applications. This is much to be deplored, for although in many instances they have been decided to be similar to those already patented, yet, in very many cases, they are rejected upon machines invented in other countries, and which are only found described in their printed books. These books are not accessible to a large number of inventors, consequently they are groping in the dark. The policy of Congress, in the laws passed relating to the Patent Office, indicate a desire that every possible advantage shall be given to inventors to examine everything for which patents have been asked, so that they may not waste their thought, time and means upon that which has been produced before. These facilities cannot be granted as the building is *now* occupied, for want of the proper room in which to arrange these rejected models.

The models now in the Patent Office have cost the inventors, at a moderate calculation, $500,000, and not a few reflect as much credit upon them as specimens of art, as they do upon their ingenuity as beautiful inventions, many of them performing in miniature the most intricate operations of full sized working machines. They should be carefully preserved as evidences of the progress of invention in the United States.

To a foreigner, the model rooms of the United States Patent Office, are a matter of astonishment; he sees at a glance the extent of the inventive genius of our country, whilst at home it is enveloped in rolls of dusty parchment. It should be the pride of Americans to foster and cherish an institution thus reflecting credit upon their ingenuity, and exciting admiration from abroad.

By the act of Congress authorizing the issuing of patents for designs, the applicants are required, when the design asked for will admit, to furnish a model or specimen. In all cases, with very few exceptions, these applications are for designs for the ornamental work upon stoves. In such cases the inventor must, at great expense to himself or the office, send either a whole stove or the plates thus ornamented, and which only fill up the already too crowded rooms with material never referred to by inventors, or by the office, and of no practical benefit whatever. I would respectfully recommend that some provision of law be asked for which will remedy this evil, or at least make it discretionary with the office to decide whether in applications for patents for designs, a specimen shall be required or not.

Owing to the rapid accumulation of models (now occupying eight rooms in the building) and the difficulty of arranging them, your predecessor found it necessary to furnish the machinist with assistance in the discharge of his duties. This assistance is still furnished, and has become necessary for the despatch of business. I would respectfully recommend the propriety of asking for an act of Congress authorizing the appointment of an assistant machinist, who should be regularly qualified by law, as from the nature of his duties he is necessarily more or less privy to the applications in the secret archives of the office.

A. B. STOUGHTON, *Machinist.*

IV.

ORIGIN AND PROGRESS OF INVENTION.

THE present is thought to be a suitable occasion to submit a few general observations, illustrative and suggestive, on the origin, early development, and future achievements of the Arts, hinderances to their progress, value to society of the classes who cultivate them, &c.; with remarks on THE MOTORS—the great levers of civilization; presuming that such will not be considered an irrelevant introduction to occasional *resumés* of the results of science, which are proposed as features in future reports from this bureau. Facts embodied in summaries of the kind would be of popular interest and permanent value.

The short period intervening between the appointment of the undersigned and the time designated by law for the presentation of this report, in connection with urgent and incessant demands of other official duties, has rendered it impossible to prepare or make arrangements for the preparation of such a document for the present communication.

ADVENT OF THE ARTS.

Man has everywhere made his debût in the character of an Orson. Soon as the curtain rises, behind which there is no peeping, as an untamed animal he leaps upon the stage, and as such goes through the opening act. The annals of all the people of old began with their condition as savages. Those of the Jews form no exception; their earliest progenitors are represented as being at the foot of civilization's ladder, both in arts and morals. Of the present occupants of the earth, the records of the enlightened trace their forefathers to various phases of this same low condition, beyond which a large portion of mankind has not yet advanced; an indication of the infancy of the species.

Man's physical wants first occupied his attention. In the dawn of his being, he was as ignorant of others as his wildest descendants are now. In common with creatures below him, his necessities were his monitors; designed by his Maker to initiate him into habits and awaken impulses that were to become distinguishing traits of his race. He was to be a thinker and worker. All creatures act more or less from reflection, but in him these qualities were to be pre-eminent. He was to live by his ingenuity and labor, according to a law from which no order of beings on our globe is exempt, and most likely on no others.

It is irrational to suppose that happiness of any kind can be realized, except as the reward of efforts to attain it. In this respect, ants and angels are probably alike. Every living thing is furnished with organs adapted to its nature and the theatre of its existence; and on the proper application of these its enjoyments and their augmentation are made to depend. Knowledge comes

not to us by intuition, and the tenderest insect, as well as the mightiest quadruped, perishes, that uses not the means given it to live. All are ordained to preserve life by the diligent employment of their faculties, and all are urged thereto by the most pressing of natural requirements. The spirit of the injunction that man should earn his bread by the sweat of his brow, was therefore nothing new, since it had been imposed as a condition of life and of the enjoyment of life from the beginning. Indeed, it is not conceivable how any of earth's denizens could have been disciplined for the work assigned them, had not their energies been stimulated into action by privations. Man certainly could not, as the story of Eden proclaims; philosophy and experience unite in declaring that, had he been encircled with perpetual ease and abundance, the sloth and the glutton, with a mind torpid as in zoöphytes, had become united in him. His sin was indolence, and in a national point of view that includes all others; it is one for which there is no forgiveness—can be none. He preferred, and so have his unreclaimed and half-reclaimed descendants to this day, to live on spontaneous food rather than earn it by labor as commanded; hence it was a blessing to expel him—a curse to let him stay. Had he been permitted in loose idleness to live—

"With brother brutes the human brute had grazed."

No one doubts that at his advent ample provision was made for him—else he had perished in his nonage—and that it was continued till by increasing numbers the species was established. He was then urged to retire from a location merely intended as the cradle of his infancy—a nursery in which he was to grow till strong enough to provide for himself. His very nature and organization made labor necessary to both mental and bodily vigor, but in the midst of plenty he had no motives to activity nor useful pursuits. Without it the race must have become extinct. Even now, with all our experience of the value of science and art, were the earth to bring forth, without culture, food in superabundance, and continue to produce it, mankind would inevitably fall back into barbarism.

As with man, so with all terrestrial creatures. None came till the earth was ready to receive them. Every genus had its Eden, in which its first representatives burst into being, and were nourished till strong and numerous enough to migrate. They, too, were then driven out.

If, therefore, wants had never been felt, THE ARTS had never been known, and without them there could have been neither science, refinement, nor morals. Happily, then—thrice happily—did sterility of soils, inclemencies of seasons, scarcity of game and other food, force man to reflect, invent, and construct—to become an artificer—and thereby to clear the way for the unfolding of the higher qualities of his being.

THEIR EARLY DEVELOPMENT.

In the arts of modern animals we find those of their earliest representatives, and in the handicrafts of living barbarians we may contemplate those current in Eden and in the colonies that sprung up around it; for there is as marked a resemblance in the primal devices of man, as in those of the groups below him, and necessarily so, since originating in the same wants, the same instinctive impulses suggested and will ever suggest them. While pressing emergencies gave rise to primal devices, necessities led to their improvement and multiplication. Whenever a marked advance took place, it seems to have arisen in much the same way as among inferior beings. If we examine the

habits and actions of these, we shall find the same diversity of temper, talents, and their consequences, prevailing as with us. The ingenious and industrious thrive; the idle and inexpert suffer. Every creature, from the lion to the lion-ant, the eagle to the ephemeron, is the author of its own fortunes, good or bad. Some, in advance of their fellows, modify staple structures and stratagems to meet unusual emergencies, and are rewarded for their pains. They are the inventors of their tribes. Novel circumstances suggest new ideas, which become manifested in new forms, materials, and practices. Precisely so with the animal, Man; As circumstances changed around him, so did his devices; and hence useful results gradually accumulated, and the avenues to civilization opened.

If necessities were the parents of invention, conveniences were its nurses and enjoyments its teachers. As society improved so did these, and keeping in advance, they courted and encouraged it on. Suggesting new ideas, they kept enlarging human prospects and eliciting new desires, which required higher efforts to fulfil. In this way the most refined of people have risen from the rudest, and in this way people must always rise. Every decided acquisition in the beginning leads to another, and it to others and others; so that the truth is now becoming apparent, that accessions to science and art can only cease with human progress: and the converse—when it is arrested, they must decline, and as it retrogrades they will disappear, one by one, till the race revert to primitive ignorance and infelicity.

WHAT IS YET TO BE DONE BY THEM.

The faculties of those who talk of limits to knowledge, and to the fruits of knowledge, are nascent. They have neither full nor half-grown ideas of man's powers, and the miracles in agriculture, chemistry, and mechanics, he has to perform. Would they judge of the future by the past, or determine what is to be, by what is? Do they think the earth is to remain as now—the greater part arid moors, dark forests, and morass? A larger—much larger—proportion of their own species, too, as destitute of mental and moral cultivation! Why, man is only entering on his task—by a few preliminary and scattered experiments preparing himself to set about it.

An infinity of work is before him. As an agriculturist, he has to lay and keep enlarging the basis of the social column. All but an insignificant portion of his splendid patrimony is yet wild land — this he has to reclaim and convert into orchards and gardens, into grass and grain-growing fields. The richest sections, the tropics, so exuberant in fertility, are to be subjugated — hardly touched by the plough, though deemed the birthplace and special homestead of the species. Free and facile communications with and through all have to be established. Add to this the purification of the atmosphere from malaria — for, by human providence, salubrity is to succeed the baneful miasma of marshes—the hot-beds of fevers and agues are to be dried up, and human life and life's happiness prolonged.

The nature and properties of myriads of unknown plants have to be ascertained — the valuable fostered, improved and multiplied; the noxious and useless suppressed. So of animals — for to us is committed the power of moulding and multiplying such as are serviceable, and of annihilating others, by removing the conditions under or by which they alone can exist. By the exercise of this prerogative, results have been brought about as singular as any in vegetable and artificial organisms. Dimensions, forms, colors, propor-

tions, habits, tastes, and the very faculties of the lower tribes, have been changed — so much so as to make it doubtful whether species and sub-species may not be due after all to this strange plasticity of animated nature. The earth is a laboratory, in which as a chemist man has hardly begun to operate. A few loose samples of what it is composed have been partially analyzed, but the bulk is not yet broken into. Then the infinity of processes ceaselessly and silently going on in organized and inert matter has to be grappled with. As a factory, too, furnished with implements and materials in superabundance, little has been done in it — nothing worth naming, in view of what has to be done. The rich stock has been neglected — not half of it has been yet even seen — while forces for fabricating it have from the beginning of time been, some running to waste, others lying dormant for want of being called up to labor.

When every force, latent and manifest, is brought into service and made the most of — when man has spread his influence over every foot of the earth's surface, and brought the stores beneath it within his reach — when mundane matter, in whatever form appearing, is made to contribute to his ends — when the planet is wholly changed from its natural wildness, as a harbor for untamed brutes and noxious reptiles, into a fit theatre for cultivated intelligences — it will be time enough to speak of human advancement as culminating, and the arts as approaching the limits of perfection.

Till these things come to pass, instead of looking for no more discoveries, we should be prepared for a constant succession of them. Prepared or not, they are sure to come; for the hosts of keen intellects interrogating nature in our own country, and the legions as busy in others, are not entreating her for nothing, nor for trifles.

Civilization may be likened to a statue, the carving of which is the business of the species. It includes all duties and furnishes appropriate employments for the varied capacities of all men for all time. Each successive age withdraws one band of laborers, and brings forward another, whose faithfulness, awkwardness, or negligence, advances or retrogrades the work. Under barbarism it was a shapeless block; with the dawn of knowledge its features began to appear, and then nations occupied themselves in chiselling away superfluous material and bringing them into higher relief. During the last century some artist-like touches were added — more have been in the present one — and in the next this great moral sculpture will be further improved, for the time can never be when to it new graces and a higher polish cannot be given. To those who add nothing to it existence is a blank.

DISCOVERIES AND IMPROVEMENTS ENDLESS.

The arts are like plants, proliferous, and like them, too, can only be improved by culture. The transformations wrought by horticulturists and pomologists are all but incredible. Peaches were originally poisonous almonds, and used to impregnate arrows with deadly venom. Cherries are derived from a berry of which a single one only grew on a stem; nectarines and apricots are hybrids of the plum and peach; the chief of esculents, with its relatives, broccoli and cauliflower, come from a marine plant, from the common sea-cale, which shoots up on some sandy shores. From wild sour crabs, scarcely larger than boys' marbles, have proceeded all varieties of apples. The largest and richest of plums are descendants of the blackthorn's bitter sloe. Such are mere specimens of vegetable metamorphoses brought about by transplanting, acclimating, crossings and culture.

It is much the same with the fruits and flowers of art. They are nothing till improved by cultivation; and from very humble and ignoble sources they, too, spring. A fowling-piece is a child's pop-gun elaborated; clay-huts were the germs of our marble mansions; a ship is a ripened canoe; and the steam-engine itself may be traced to covers ejected from primeval caldrons. The highest elegancies are descendants of very homely progenitors. Our ladies adjust their shawls of cashmere before glass mirrors supported by Psyches; primitive belles covered their shoulders with skins of newly-slain animals, and admired their unctuous faces in pans of water and polished stones. A Jacquard loom is an Indian's weaving frame matured; and printed volumes are deducible from quippos and historic belts of wampum. Like plants, inventions grow and multiply, and to congenial minds present a class of varied beauties, captivating as any with which amateur and professional florists are charmed.

Newly acquired truths in physics are keys, each of which unlocks a world of wonders. Every new art gives birth to a thousand. The range of discovery is undoubtedly illimitable—a truth that has only dawned recently with full conviction even upon savans. A century ago few minds were prepared to receive it, and fewer to act on it. Pregnant with hope, with present and prospective acquisitions, it is among the divinest of modern convictions. Navigators have added, some islands, others continents, and the woolcomber's son of Genoa gave a hemisphere to geography. This done, comparatively little was left of the earth's surface to explore. It is not so with science, nor the applications of science. In them fresh additions, new continents, new worlds, and new systems, are realizable for ever. The study of nature's mechanisms, of God's own applications of the same principles and materials He has given inventors to work with, is only beginning. The UNIVERSE is before inventors, and all its elements and energies invite their attention. There is, therefore, no danger in expecting or attempting too much, provided they aspire not beyond where Nature herself has gone, and even then illusions vanish with experiment.

There is a good moral to be drawn by daring inventors from this fathomless and boundless ocean of novelties,—it is this: Avoid crowds of small craft in quest of improvements, and launch out your barks in search of original things. True genius is rather ambitious to bring up pearls of its own, than solicitous to polish those of other men. Since there is such abundance of room for all, it should be the determination of every one to occupy some ground of his own,—to use another figure, to seek "*placers*" untouched, in preference to sifting in old diggings.

DIGNITY OF MECHANICAL PURSUITS.

It is a singular vagary that men to whose genius and industry the world is indebted for what is most valuable in it, should have always been held in low esteem. A habit of modern, it was a passion in former times, to look askant at those who use the hammer or spade, under the fond delusion that the less wise men have to do with gross matter, the nearer they resemble the Great Spirit; whereas God is the greatest of workers—the chief of artificers. So far from locking up his wisdom in abstractions, he is incessantly embodying it in tangible things; and in them it is that his intelligence, ingenuity, and re-

source are made manifest. What is this world but one of his workshops, and the universe but a collection of his inventions? In him the squeamishness of half-formed philosophers and of high-bred fashionables respecting manual and mechanical pursuits finds no sympathy, but terrible rebuke. His works proclaim his preference for the material and useful to the merely imaginative, and in truth it is in such that the truly beautiful or sublime is to be found. A steamer is a mightier epic than the Iliad; and Whittemore, Jacquard, and Blanchard, might laugh even Virgil, and Milton, and Tasso, to scorn.

There is, moreover, a morality belonging to the arts that as yet has been little heeded; a lever, hammer, pulley, wedge, and screw, are actual representations of great natural truths, and the men who revealed them may be said to have been inspired. The divine afflatus flows through many channels. In fact all truths are allied—the decalogue being an exponent of moral, as are mechanical inventions of physical, and axioms in science of philosophical verities—hence, whatever science discovers and art applies is divine, and ultimately tends to eradicate evil; indeed, all teachings begin with the arts, and nothing is more certain than that all must end with them. If we glance at existing nations, we invariably find those that excel in arts and sciences most deeply imbued with moral principles—the foremost and most active in the benevolent enterprises of the age.

Inventors, then, are revealers and expounders of the practical doctrines of civilization, and more than any other class have they shown us how to lessen life's evils and multiply its good. The connection of morals with expanding science and art, and the necessity of their union to the elevation of the species, are beginning to elicit attention. It is now perceived that deviations from principles of science—either in agriculture, arts, manufactures, in processes or pursuits of any kind—are errors, and all errors, in an extended sense, are SINS—are violations of Divine laws. And though sins of ignorance they carry, and will for ever carry, their punishment with them, viz: in imperfect results and the infliction of unnecessary inconveniences, expenses, and toil, in spending strength for naught.

Not till mechanical as well as ethical science is fully explored and universally applied can man attain his destiny, and evil be swept from the earth.

It has been regretted also, as an evil of magnitude, that, while the arts administer to the necessities of the species, a general knowledge of them has not been demanded as a feature of popular education; that while the works of historians, poets, and theorists, have been adopted as models by which to form the taste and excite the ambition of youth, the great doctrines of life, as exemplified in the processes by which the products of the planet, its forces, and the properties of its substances are converted into the elements and accessories of material and consequently of mental refinement, have been neglected.

But such are errors belonging rather to the past than the present or future. Their detection is a presage of their disappearance. Evils incident to the progress of society they, with many others, are only gradually to be surmounted. The philosophy or physics of the workshop is but beginning to be understood,—true estimates of its value to be formed:—indubitable proofs, however, that the movements of civilization are onward and upward. It is now perceived that in ordinary avocations, principles of science are invoked, that furnish subjects of research to the profoundest minds, and such as may serve to quicken and enrich the perceptions of the most inquisitive.

INVENTORS AND WHAT THEY HAVE DONE.

A world without inventors would consist only of forest and swamp. Before they appeared, it was, and where they are not, it is, an Australian jungle, through which men affiliated with beasts roam in quest of miserable subsistence and shelter. The difference between the civilized and troglodytes is, one class contrives, the other does not. Nothing is clearer than that mechanical inventions are ordained to animate, clothe, and adorn, a naked and torpescent world—to infuse into the species the elements of increasing vigor and felicity. Even as arts multiply and flourish, the chief labor of working out the great problems of existence continues to devolve upon inventors. Without them the prospects and hopes of the present had neither been seen nor felt. It is they who, by discovering new physical truths, are establishing the grandest of moral ones—*Perpetual Progress*—illimitable advancement in social, civil, and intellectual enjoyments.

The fact has scarcely, if ever, been glanced at, that nearly every marked advance of civilization began with and is due to inventors. Without disturbing old records, it is enough to turn a leaf of modern history. The substitution of fire-arms for primitive weapons, has wrought an entire change on the face of society. Another and ever-memorable epoch was introduced by the revivers of printing and inventors of type founding; another by steam as a motor; to say nothing of the revolutions brought about more recently by spinning-jennies, power-looms, ocean steaming, gas-lights, photography, railroads, telegraphs, &c., which so honorably distinguish our times from all that preceded them.

But for the artificer's skill, the sublimest of the sciences had not been attempted, nor the sublimest triumphs of human reason and research achieved. By means of two inventions, the extremes of creation are brought within the range of human observation, and the grandest of conceivable miracles demonstrated. With the microscope, the human eye discovers animated worlds in drops of liquid and grains of fecula, and may yet detect ultimate atoms in the most attenuant of the gases. By the telescope, the same eye penetrates and wanders at leisure through a space far beyond what was once thought the limits of an arch-spirit's flight. Leaving the satellites of remote planets behind, it resolves the infinitely more remote nebulæ, and, sweeping round the awful horizon, takes in what would seem half the universe.

At a more favorable time than Fitch lived in, Fulton rose, and steamers began to creep up rivers, next dashed over lakes and inland seas, and now are rushing in fleets over every ocean. Whitney appeared, and forests were swept away to make room for cotton fields—thus turning the soil from harboring beasts of prey, to raising clothing for half mankind. Daguerre, and the sun turns portrait painter—exemplifying a classic myth. Stranger still, Morse and his compeers have bridled the most subtle, fitful, and terrific of agents, taught it to wait, silent and prompt as a page in a monarch's ante-chamber, and when charged with a message, to assume the character of a courier whose speed rivals thought and approaches volition. From the beginning, means more or less rude and refined have been employed for the conveyance of material things, but not until now has the transportation of thought—of thought divested of aught visible or ponderable—been attained. Indian runners hasten with information through floods and forests, over hill and dale; but to carry it, they convey themselves as packages containing it, or as tablets on which it is impressed. So also with the contents of our mails—minds commune

with distant minds through the gross medium of printed and written paper; whereas, by means of artificially evolved lightning, a postal system is established akin to the spiritual; for by it, thoughts are made to dart through space unclogged by symbols and envelopes, and consequently unretarded by carriers and postmen.

The wildest freaks of fancy have been strangely verified in the telegraph, as *outré* bottle-imps and more attractive fairies; giving color to the proposition that in nature's arcana are germs of every popular superstition, and that no prevalent delusion is without its corresponding truth. Be this as it may, the chiefs of modern Prosperos, by means of a few strips of metal, release from jars of acid spirits so agile and obedient, that, on the slightest tap of its master's finger, each one flies with messages over a hundred leagues of latitude, delivers them, returns, and is in waiting for others before the signals can be repeated, or the pulse beat twice! An ancient elf boasted of putting a girdle round the earth in forty minutes—these modern sprites can really do it within half a one. If art and science allied have done such things, what is it they cannot do?

If machinery don't *think*, it does that which nothing but severe and prolonged thinking can do, and it does it incomparably better. In the composition of astronomical and nautical tables, accuracy is everything. Many a ship has been wrecked through wrong figures in "Guides" to navigation; but absolute accuracy, continued through abstruse calculations that occupy months, and sometimes years, is too much to expect even from the most sagacious, studious, and careful. But suppose it attained; the next difficulty is to transfer the results, untainted with error, to printed pages; a source of mistakes which few besides authors and printers can appreciate. If other persons were told of the impossibility of copying from manuscript millions of figures without misplacing, leaving out, or inverting more or less, they would hardly yield their assent. It is enough to say that perfection in elaborate and difficult calculations is unattainable with certainty by human figuring; nor is it to be expected in the professional labors of the most expert compositors.

Now, automata have been made to work out arithmetical problems with positive certainty and admirable expedition; relieving mathematicians and others of an incalculable amount of mental drudgery—drudgery that has worn out the strongest constitutions. Moreover, they carry the use of numbers further than the clearest intellects dare follow—to an extent that language lacks terms to express. In human computations, minute errors creep in and corrupt the whole, often requiring months of the closest ratiocination to find out; but calculating machines detect their own mistakes at once, correct them, and then shutting out the interference of human fingers as well as heads, and with them the chance of marring the work, they print their tables as well as compose them—thus producing works to which entire confidence can safely be given.

The power inventors wield is not less manifest in the changes they have wrought in the habits, customs, and occupations of females, than it is obvious in the pursuits of the other sex, in the outdoor world. They have not only broken up the time-honored arrangements of the kitchen, wash-house, and dairy, but have invaded the parlor and even boudoir. A century ago the rock and spindle were common;—in Europe are women who still twist thread with their fingers. Fifty years since, the wheel had a place in every dwelling, and carding no less than spinning was a domestic duty. With thrifty housewives the shuttle, too, was not a stranger. Within twenty years knitting was

indispensable; not a few of our farmers still wear homemade hose. Then straw-plaiting, tambour-working, lace-making, plain and fancy embroidery, with other delicate operations of the needle, were and are still taught as necessary accomplishments. Such they will hardly be held much longer, since these and various other performances are now done by automatic fingers with a precision, regularity, despatch, delicacy of touch and finish, that no human organs can rival.

Most, if not all, the fine arts have been subdued by mechanism. The lathe is still to be met with in its primitive forms, in the potter's wheel, the spring-pole instrument and also as used in the modern Egyptian's atelier—(seated on the ground, this artist employs one hand to revolve the object to be formed, holds the cutting tool in the other, and presses it on the rest with his toes.) The lathe, so long confined to shape articles whose sections were circles, now produces oval, elliptical, epicycloidal and eccentric work; copies medallions, and even busts in equal, enlarged or reduced proportions—performing the work of the engraver, die-sinker, and statuary or sculptor.

The richest figured tapestry and damask in relief, are now produced by magic mechanism. Looms rival the palette and burin; besides gorgeously-colored carpets, they weave landscapes equal to oil paintings, and portraits after the finest line engravings. Then, from the increase in number of sewing machines,* the time would seem not distant, when the needle itself, and thimble will be exhibited in museums with distaffs, spinning-wheels, knitting-wires, tambour-frames, hand-looms, lace-making bobbins and pillows, and other antiquarian curiosities, as evidences of imperfect civilization. In chromo-lithography, automaton artists rival the finest touches of old masters, and shortly will multiply by millions, their most esteemed productions.

Though not suspected, the power of inventors over human affairs, is already supreme; machinery even now governs the world, though the world does not acknowledge it.

ERRORS ENTERTAINED RESPECTING INVENTORS.

It is a prevalent opinion that both ordinary and extraordinary inventions cost their authors little labor and thought to develop: nothing is more erroneous. It is an essential element of man's being, and of the constitution of things under which he exists, that all truths, mechanical or philosophical, can only be realized by strenuous and continued effort. Our perceptive faculties are too obtuse, and happily for us it is so, to apprehend them at a glance. In that case, they would be held too cheap to be looked for, and deemed worthless when seen. If inventions required no exertion to discover, where would be their value? If virtue cost nothing, it would cease to be virtue. No fact is clearer than that man's destinies are in his own hands, and that he alone can exalt and debase them. To rouse him to be faithful to himself, is nature's ceaseless care. With powers dormant in him, and equal to every exigence, she leaves him to exert them or not. She does naught for him that he can do for himself, and has taken care that he shall know nothing, have nothing, that he does not strive for.

It is common to hear ingenious men disparaged by ascribing their best things to lucky or random suggestions—whereas, though appearing fortuitous, they may always be traced to previous reasonings or reflections: sprouting seeds whose transient plantings had been little noticed and forgotten. They

* Four patents have been issued from this office for such machines during the past year.

had never sprung up had they not fallen on soils prepared by previous culture to receive them. Sparks set not sand on fire, nor do fruitful ideas germinate in barren minds. Flashes of thought, like those of the electric fluid, may dart suddenly and unexpectedly, but they are not less the regular effects of inducing causes. Inspiration descends not in its highest or its lowest forms, but on those who seek to be inspired.

It is not given to man to perfect aught without toil, and seldom without long-continued toil. The smith forges not a ploughshare with a blow, nor is any new device, however simple, matured save by repercussions of thought. *Nul bien sans peine* is a universal truth.

PROSPECTS BEFORE INVENTORS ARE BRIGHTENING.

More corect views of genuine celebrity are obtaining, and high time it is, since the trumpet of fame has seldom been blown by a seraph. History, the voice of the past and which ought to have been a safe monitor for the present, has led the world astray with regard to honor and its truest sources. How little has it contributed to foster those occupations which tend to humanize the species, and how much to cherish others? It has done next to nothing for humanity but to debase it; fostering the worst passions, it has all but strangled the best. If not written for the sole purpose of preventing the earth from being enclosed within the pale of civilization—of continuing it as a series of hunting-grounds under old forest laws, for broods of human tigers—it seems to have been composed for little else. What is it on the whole but a recital of the feats of prize-fighters, and of the passions of brutalized spectators? Representing the arts of peace as mean, it has taught that nobility and glory are won amid rapine, conflagration, and slaughter. Its feasts, so called, are fitted chiefly to whet the appetites of accipitrines.

But it is one of the most encouraging signs, as well as a growing characteristic of the times, that paths to pre-eminence are opening to all men; that as honorable renown awaits agriculturists and artificers, as has been attained in other pursuits. There is, indeed, no degree of distinction which may not become theirs if they devote themselves to the latent truths connected with their professions; for as sublime principles of science are yet to be drawn out of the ground we tread on, and from the air we breathe, as have been discovered in the ocean of worlds above us. Justice will be awarded to enlightened workers as well as to mere thinkers—to laborers as to speculators on labor. Even now writers are beginning to expatiate on the poetry and morals of mechanism, on its powers to please and instruct; and by-and-by it will be admitted that, for rich and varied thought, for boldness, grandeur, and minuteness of conception—simplicity and complexity of design; for the union of the agreeable and the beautiful, the beneficial and the marvellous—poems carved out of wood and forged out of metals equal, if they do not surpass, the most imaginative of creations.

In permanency and purity of fame, few will hereafter rival practical men. Than they, few will stand higher among the great—none better among the good. Will his country ever forget the souvenir Fulton gave her? In what age will not children lisp the name of Morse? How often are popular writers accused of pandering to the passions; but what contributor to the arts is a corruptor of morals? Like the works of the Divine Artificer, theirs tend to elevate, not to debase.

If agriculture preceded the mechanic arts, its progress beyond primeval efforts has depended upon them. They made it what it is, and are fast disclosing what it is to be—clearing the way for it to advance where it was never known, and to flourish beyond all precedent. Locomotives now darting, and others preparing to follow, through deserts and over wild lands, scatter rich blessings in their train; dark forests are falling before them, and cultivated fields and smiling villages are everywhere springing up on either hand—the mightiest agents yet revealed in enabling man to fulfil his destiny in subduing the earth.

If any classes can be said to hold the future destinies of the planet in their hands more than others, it must be engineers and mechanicians. These men are filling the world with new ideas and agitating it with their projects. Within the last half century they have revolutionized society, and are preparing to bring about still greater changes. We cannot move without feeling their influence, nor can the world go on a day without them. Although hitherto united by no bond of union, they will, if faithful to their mission, make themselves felt in its future management.

INFLUENCE OF FREEDOM ON THE PROGRESS OF ARTS.

The passion for philosophical inquiry and stirring enterprise, so characteristic of our citizens, is the natural result of independence in thought and action. Political oppression, however mollified, acts as a drag on the intellect. Shackled in one thing, the soul is more or less fettered in all. The genius of invention may exist elsewhere, but it flourishes only under the ægis of freedom. It could not do otherwise without violating an organic law of our being. Who thinks of looking for great thoughts, or for men to work out great problems of humanity, where mind has for ages been squeezed into moulds formed to distort and to dwarf it, and not rather where it is free to obey its native impulses and soar where it listeth? If practical science with us does not surpass what has been accomplished in it by others—if we do not contribute more largely to the stock and to the efficiency of automatic mechanism—either nature will not be true to herself, or we shall be traitors to her.

We experience none of the embarrassments and sufferings which the ingenious of other lands have for ages been struggling with. It requires no small amount of faith to credit them or the sanity of those who sanctioned them, and it is all but incredible that the oppressed, possessing the spirit and feelings of men, were not maddened into unquenchable fury by their deep and lasting wrongs.

Court profligates, in want of money, were invested by monarchs—who claimed a right to dispose of the property as well as persons of their subjects—with monopolies of the various occupations of the productive classes, and forthwith those who followed them had to purchase licenses to continue their trades, of the favored courtiers or companies to whom they sold out. This was carried to such an extent that no branch of business escaped; professions the most essential to existence, as those of the baker, miller, dealers in fuel, light, soap, &c., were thus disposed of. The genius of wrong presided over every department of industry and art—every addition to material civilization has been laid under contribution by it.

M. Perpigna, a French writer on the law of patents, alluding to the treatment of the mechanics and manufacturers of that country, has, in reality, portrayed the devices by which those of the whole of Europe were harassed, and by which some are still harassed.

Fettered and oppressed in every way as France was under the government of her despotic kings, the spirit of invention and enterprise could never rise to high conceptions. Manufacturers, placed under the severe control of men who purchased their offices from government, and who, therefore, exercised them with rapacity, could not hazard any improvement without infringing the established regulations, and running the risk of having their goods destroyed, burnt or confiscated. In every trade official regulations prescribed to workmen the methods of working, and forbade any deviation from them under pain of the most severe punishments. Ridiculous to say, the framer of these statutes fancied he understood better how to sort and prepare wool, silk, or cotton, to spin threads, to twist and throw them, than workmen brought up to the trade, and whose livelihood depended on their talent.

To insure a compliance with such absurd regulations, inquisitorial measures were resorted to—the residences of manufacturers entered by force—their establishments searched and explored, and their mode of working inquired into. Thus their most secret methods were often discovered and pirated by fraudulent competitors.

The excesses committed under these tyrannical statutes were such that one can scarcely conceive how any nation could long submit to them.

The minister, Roland de la Platiere, giving a deplorable account of the numerous acts of oppression he had witnessed, says:

"I have seen eighty, ninety, a hundred pieces of cotton or woollen stuffs cut up and completely destroyed; I have witnessed similar scenes every week for a great number of years; I have seen manufactured goods confiscated—heavy fines laid on manufacturers—some pieces of fabrics were burnt in public places and at the hours of market—others were fixed to the pillory with the name of the manufacturer inscribed upon them, and he himself was threatened with the pillory in case of a second offence. All this was done under my eyes at Rouen, in conformity with existing regulations or ministerial orders. What crime deserved so cruel a punishment? Some defects in the materials employed, or in the texture of the fabric, or even in some of the threads of the warp!

"I have frequently seen," continues Roland, "manufacturers visited by a band of satellites, who put all in confusion in their establishments, spread terror in their families, cut the stuffs from the frames, tore off the warp from the looms, and carried them away as proofs of infringements. The manufacturers were summoned, tried and condemned—their goods confiscated, copies of their judgment of condemnation posted up in every public place—fortune, reputation and credit, all was lost and destroyed—and for what? Because they had made with worsted a kind of cloth called *shag*, such as the English used to manufacture and even sell in France, while the French regulations stated that that kind of cloth should be made with mohair. I have seen other manufacturers treated in the same way because they had made camlets of a particular width used in England and Germany, for which there was a great demand from Spain, Portugal, and other countries, and from several parts of France, while the French regulations prescribed other widths for camlets.

There was no free town where mechanical inventors could find a refuge against the tyranny of the monopolists. No trade but what was clearly and explicitly described by the statutes could be exercised; none but what was included in the privileges of some corporation.

How was it possible for any invention to thrive under such oppressive regulations?

No one could improve on a method or deviate from the prescribed rules for manufacturing stuffs of cotton, worsted or silk, without running the risk of being heavily fined, having his frames destroyed, and his manufactured goods burned in the public place by the hands of the executioner.

Many inventors were forbidden to reduce their inventions into practice, when their application for letters patent was not supported by powerful recommendations, or when they were unable to bid a high price for the good will of the clerks of office.

What made the rights and privileges of corporations still more odious and oppressive, was that they were granted for an unlimited time.

But the public mind, instructed by the writings of Voltaire, Rousseau, Montesquieu, and many other authors, had become too enlightened to allow such abuses, transmitted from ruder times, to be maintained in their original barbarity. A cry for the emancipation of the human mind, raised at first by philosophers, was soon echoed by the people, and a concession to public opinion became every day more necessary.

A declaration of Louis XV., made in 1762, reduced all privileges to fifteen years. This was certainly an amelioration.

The memorable edict of 1776, given by Louis XVI., by suppressing all monopolies and corporations, opened to arts and manufactures a new career, and offered a powerful encouragement to industry. But this suppression of monopolies excited the opposition of private interests; and the French ministry, by annulling, without any compensation, monopolies which had been purchased by several trades, and sold at different times by Government itself, committed an injustice and breach of faith which the best intentions could not justify. The celebrated Turgot, framer of the edict, was obliged to retire from office, and the edict itself was repealed.

After the failure of the attempt made to throw open every trade and every profession, several other edicts were issued to lessen the oppression of the existing statutes; but the evil had taken too deep a root to be removed by such weak measures. It subsisted, therefore, more or less until the French revolution, when all privileges were, in one day, abolished and destroyed.

French arts and manufactures, freed from bondage and from the oppressive yoke under which they had groaned for so many centuries, began a new life. The French people possessed at last the free and uncontrolled exercise of their faculties, by the removal of obstacles which a blind policy had thrown in the way of improvement. That was a material point obtained, but it was not sufficient; it was necessary besides to secure to all men residing in France, whether natives or foreigners, the peaceable enjoyment of the fruits of their exertions; this was done by the laws on patents, passed in the year 1791."

The connection of civil and religious emancipation with progress in arts, and consequently with the highest of human interests, is becoming daily more and more apparent. The influence of free institutions is extending far beyond mere political regeneration; they have higher objects to attain and grander results to bring about. It is not enough for them to lift up the long prostrated victim of oppression—to cause him to stand erect, and with palpitating heart and swelling chest, to feel himself a man; this is but preliminary—a removing of the loads that have pressed down his aspirations and held him from his destiny. They have to introduce him into higher dispensations, intellectually and morally. By the silent teachings of our example the world is

awakening to the evils of absolutism as a foe that would rule the present by the past, and perpetuate a combination of puerilities and wrongs that are doomed to be associated with fossil remains.

A belief is prevalent that the enfranchisement of the world is drawing nigh, nor are they who believe this without grounds on which to rest their faith and build high their hopes. Everywhere men are beginning to feel that they are not made solely for rulers to sport with and prey upon; to be drilled as gladiators for their pleasures and used as drudges for their profit; to have the most sacred of natural rights taxed as privileges—to endure an excise on existence. Better for millions had their organization been below the human type, than have their soul's impulses crushed and the chief purposes of life foregone in order to minister to the luxury and perpetuate power in the hands of the infandous.

The great reality of the age, the start taken by the species in social, civil, and intellectual advancement, is not more observable in the improved and improving condition of the arts than is the fact that it *originated in them*. The movement, too, not only began with, but its increasing momentum comes from them. If they flag, so must it; while they progress, nothing can retard it. But the prospect is joyous, for as respects them the cup of the future is brimming, and foaming, and sparkling, with hope. Never before have draughts so refreshing, so pure and priceless, been brought within reach of human lips. To arrest them, enemies of progress should levy taxes on electricity and steam, as they have upon knowledge; or ask the Deity for their sakes to withdraw water and fire from the earth and lightning from the heavens.

To proclaim perfect, that is, absolute liberty to the sciences and arts, is to establish the sanctity of human rights on their surest, because their natural foundations. Had rulers never been permitted to meddle with them—to cripple under the pretence of protecting them—to smother genius while affecting to foster it—our current marvels had been developed ages ago, and devices and discoveries yet in the womb of the future had been in universal use now.

Leave the arts free, and the world can never become a desert again. There can be no decay of nations without a decline in them; but when they are no longer fostered, or when such only are cherished as tend to aggrandize the great, empires *must* become extinct and their proudest monuments crumble away. Ancient legislators did not understand this, and the present disordered condition of a great part of the earth is the result of their ignorance. They preferred the exaltation of a class to that of the masses, mistook magnificence for power, and military force and idle display for prosperity. What are the accounts of their contests, and what the relics of their palaces and pyramids but monuments of their folly—sad reminiscences of populous cities, now desolate wastes—of people once mighty, now no longer known. Had they perceived that nothing can be lasting that is not beneficial to society at large, and had they under that conviction devoted the treasures they squandered to the general diffusion of science and art, the earth had not now been sprinkled with the tombstones of nations.

V.

THE MOTORS:

CHIEF LEVERS OF CIVILIZATION.

There is one subject more intimately allied than any other with progression, and of unrivalled interest in the present and prospective condition of the world, viz., that of *the Motors*. It is deemed not improper to dilate briefly on these chief levers of civilization, with the view of bringing them more immediately to the notice of inventors, and of invoking the attention of Congress to a series of proposed prizes for new prime-movers and other discoveries in science and art. A hint to the ingenious is as a word to the wise—to name desiderata has often led to their realization.

Physical forces are everything on our orb, as they must be on every other. It is motion that imparts vigor and beauty, animation and colors, to nature; and motions are merely manifestations of forces. Deprived of these, the earth, instead of her diversified harmonies, would present a lifeless and chaotic mass. There could be no transition or change; a breath could not blow, nor a tree grow, nor animals or atoms move. They are the conservative agencies of creation, and the bases of even intellectual and moral developments.

Of their nature little is known, save that, like most natural phenomena, they are infinitely diversified in their manifestations. Not amenable to any faculty of the senses, they are known to us only by their results. Apparently strangers to, yet they dwell in and are energetically at work in the most silent and quiescent of bodies—ceaselessly decomposing and recomposing them—as well as the restless and the living. They whirl planets round their orbits, and children's tops on our floors—are disclosed in the movement of an eyelid, the buzzing of an insect's wing, the struggles of an elephant or a whale—in the sprouting of a plant, and the upheaval of a continent, in the imperceptible ascent of vapor, as in descending torrents, in combinations of acidulous and alkaline solutions, in the poles of a magnet, explosive mixtures, volcanoes, thunder, lightning, snow, hail, and wherever a change of temperature takes place.

The primal elements of civilization, it was necessary that chemical and mechanical forces should be found in abundance, so as to keep up, *pari passu*, with man's progress. And such is the fact; the earth is a storehouse of them, in which they are furnished as it were, in packages of all sizes, qualities and intensities, so as to meet all possible exigencies. And it will appear that as he calls them into his service, they become the proofs and the measure of his advancement; for in proportion as he employs them, intellectual and moral attributes accumulate upon him.

Inventions for modifying and conveying motion from one machine to another, or for distributing it to various parts of the same machine, frequently

evince striking ingenuity; but the disclosure of useful forces indicates a higher order of research, and is fraught with vastly more important results. Improvements in mechanism are to a certain extent limited and local, but the advent of a new motive agent would be felt throughout the circle of the sciences—as exemplified in the case of steam. It would open new channels of industry and wealth, and give rise to devices and applications novel and innumerable.

Man rises with the motors. His growth begins with them, and only as he extends their applications or adds to their number, can he increase in real stature. Nothing can compensate for their absence, for nothing valuable can he acquire but through them. Steps of a ladder resting upon earth and reaching to heaven, he is without them an earth-worm, with them almost a God. His destinies are and ever must be wound up in them.

The chronology of human condition is comprehended in the cycles of the motors, and in them will that condition be best studied and understood. We are not to suppose that the annals of nations are for ever to be meted out in petty dynasties, or those of the species by mere circles of years; on the contrary, the probability increases that eras will be determined by revolutions in science, and the condition of generations measured by their chief motive-agents.

NONAGE OF THE MOTORS.

Take up man's biography where we will, the first page opens with him roaming the forest—an untutored animal, preying upon inferior tribes as they prey on one another. He knows no force but his own, dreams not of employing any, and hence is his own servant in everything. By-and-by, as game becomes shy and scarce, he ekes out the means of living by cultivating a patch of mandioca or maize—using a stake for a plough, and a shell for a sickle. In this condition properties of some of the elementary machines unfold themselves, as those of the wedge, inclined plane and lever. In his club he realizes those of the hammer, which has claims to a place among them. Still he remains a wild man—a savage. Such is the nonage of the motors, and such man's invariable condition where they are not.

While there is a wide disparity between man's muscular power and the requirements of civilization, there is an observable proportion between it and his wants as an unreclaimed animal. The required outlay to procure the first necessaries, is neither too much nor too little. In the savage and semi-savage condition he has strength to build a hut, hunt, dig, plant, and reap, a sufficiency for himself and family; but had these essential tasks required double the labor that they do, the race would have sunk under it ere the art of calling in foreign aid had been acquired. On the other hand, if food, clothing, and fuel had been attainable with half the exertion, indolence and every evil passion would have prevailed; hence the wisdom of Providence in forbidding the earth to yield the means of existence except in return for such an expenditure of labor as would train him in the first stages of his career to habits of industry, and prepare him for disciplining higher faculties by another species of activity.

It is true the amount of indispensable toil differs in different parts of the earth. In the torrid zone the soil is prolific, fruits are perennial and in rich abundance, little is required for shelter and less for clothing; an equalizing principle is, however, everywhere apparent. There men are less able to work—their energies are sooner exhausted than in temperate climes, but exertion is inevitable. They also are forced to labor in order to live.

ERA OF ANIMAL FORCES.

In the next stage he plants more and hunts less. The social qualities of his being open, and higher views of existence flit before him. His hut in the woods is abandoned for the village-cabin. Primitive manufactures arise, improve, and multiply. Agriculture is more and more appreciated, and with increasing demands for it, the value of labor is felt; he wants more than he has; human strength is not great and is soon exhausted; in his need he reflects, and reflection brings help. There are quadrupeds stronger than he, and of greater endurance; why should they idle away their existence and he be compelled to daily toil? Why not make some of them work for him?

Thus he reasons, and, according to climate and other exigences, acts. Hence Laplanders yoke reindeer, and Esquimaux dogs to their sledges. The Arab early seized the dromedary and camel as his drudges, and other people the ox. The slender Hindoo and lithe Malay bring in the elephant from his native jungles, for the same purpose. Finally, the horse, mule, and ass were added to the list, and the era of animal forces exhibited in relief.

Other creatures were also educated for man's profit or pleasure in a less general way. Goats and dogs were trained to climb in tread-wheels, and bears were broken in to the same kind of labor by Scandinavian tribes. Then there was hawking, leopard-hunting, and fishing with cormorants, as still practised by the Chinese. Old Egyptians taught baboons to gather fruit from precipices and trees inaccessible to man. The Chinese still employ them and monkeys at similar work.

From the excess of power with which some animals are endowed, it may be inferred that they were designed to serve as co-laborers with man. Were this not so, it would be difficult to assign the reason why the larger quadrupeds that have been domesticated possess a surplus of strength far beyond what their natural emergences seem to require, while to us who stand in the greatest need of it, so small a share has been given. As all acting forces on the globe are derived from bodies living or inert, it was nature's suggestion, first to turn to the larger quadrupeds; the most decided step this toward civilization. In what a lamentable state would our species be now, had it yet to be taken! From their comparative docility herbivorous tribes were properly selected.

The power man exercises over animals, is one of the most remarkable episodes in his history. It is miraculous, but, like other miracles, having become familiar, it ceases to surprise. They are plastic almost as clay in his hands, for he moulds them as his fancy and wishes suggest. Selecting some as laborers, he adds muscle and bone, or withdraws them as strength or speed is required. Thus he produces race and draught horses from one stock, and works equal changes in porcine, bovine, ovine, and canine families. Of fowls, take pigeons for an example; their figures are so far under his control that he multiplies varieties till every apparent affinity with the original is lost; their colors, too—producing spots where he pleases, or, as the professional expression is, breeding them "to a feather."

Larger numbers of animals are employed as chemical manipulators for the production of such substances as he finds useful for his purposes, and which he compels them to yield in larger quantities than they would or could give

out without him. He controls the qualities of these products also; eliciting in excess constituent elements that he most desires. Of insects he keeps myriads at work as confectioners—other tribes as spinners, and others again as druggists to supply him with dyes. We may boast of interesting compounds which modern chemistry has furnished, but what are they compared to the products of these living laboratories—laboratories, the most valuable of which he has improved and multiplied, and will, until analogous results, at a cheaper rate, are obtained from artificial apparatus.

Had nothing been told us of ancient American arts, we might have inferred the amount of refinement pervading Chili and Peru from one fact alone—the employment of the llama as a beast of burden, the only one within reach—a step this which tribes wholly untutored never took. The aborigines of the north had the bison, and in the proportion that its strength exceeds that of the American camel, would they have excelled their Austral kindred, had they broken it to the yoke. They neglected to improve the talent committed to their charge, and are compelled to make way for those who will. The buffalo, for unknown ages, has been used in tilling the soils of Asia and Africa. Had our Indians pressed it into the same service here, they would not now be as fugitives and vagabonds in the land of their fathers.

The vast multitudes of bisons slain yearly, the ceaseless war carried on against them, if continued, threatens their extermination, and must hereafter cause deep regret. It has been remarked that every addition a country receives from art tends to drive away animals fitted only to flourish in a state of nature; but here, in the absence of art, the very agents to introduce it—creatures adapted above all others to human servitude—are wantonly destroyed. Their great strength and docility, when tamed, and their capacity for being drilled to the yoke, ought surely to put some limit to their wholesale butchery. Savages kill them for food, while men of another shade, who ought to know better, join in the slaughter for the pleasure of the hunt, and sometimes, it would seem, for material for a paragraph.

What one offender has said is applicable to thousands. Describing the grand and terrible bearing of an old bull tearing up the ground; how one ball was flattened by, without penetrating the skull; how a second barrel drove another bullet into the victim's vitals and brought on its dying agonies: he adds—"I was satisfied, and taking the tongue, the hunter's perquisite, retired." Rejoining his party, who had abundance of food, he left the carcass, as is usual, for vultures and bears.

But for this genus it is doubtful if man had ever permanently emerged from the forest. As the first ordained and most profitable of his assistants for working the soil, it should never be said that the noblest of American indigenous ruminants have become extinct. As predial laborers, they belong to the most precious of quadrupedal existences, and, viewed in that character alone, their wanton destruction should be arrested. Reproductive locomotive engines, they offer a power available to turn the wildernesses and prairies they inhabit into corn-fields and gardens.

"Onward!" is the standing order of God. Those who refuse to obey must be pushed aside—such is the inflexible fiat of Heaven. They who prostrate their judgment to their sympathies are at a loss to reconcile the melting away of the red race, and the seizure of their lands by the whites, with a superintending Providence. How so terrible a catastrophe as the disinheriting and consequent annihilation of the entire occupants of half

the globe can accord with Divine justice, or how the righteous and Supreme Arbiter permits it, they cannot see—simply because they have yet to learn that the Creator has ordained distinct and independent laws for the material as for the moral world—and that obedience to one class cannot, under any contingencies, compensate for neglect of the other, nor evade nor diminish the consequences of their violation. The action of those relating to external nature can neither be arrested nor accelerated by principles of ethics; the wicked who obey them will prosper, the righteous that neglect them must perish. No man's virtue makes his body bullet-proof, nor can the better qualities of an ignorant, idle, roving race, induce God to throw the world off its hinges to indulge them for ever in such habits. Races and nations are saved by works, not by faith.

INORGANIC MOTORS.

Human and animal powers are limited, require replenishing by food and rest, are uncertain from sickness and casualties, unequal and quickly worn out. Had none but such been within our reach, civilization had been arrested ages ago. It was necessary, in order to fulfil his destiny, that other than living forces should be under man's control—and in the acts of discovering and applying them, his character and energies were progressively to ripen. The first of the kind were forces naturally excited and ready for his service.

Water.—Observing minds from the beginning noticed the momentum of water in cataracts, rapids, and quick running streams—nor could those of an inventive turn fail to perceive its application to laborious operations in the arts. A stream that hurried along trees and other heavy bodies would easily sweep round a few boards arranged around an axle and made to dip in it—an under-shot wheel. The first motive water-wheel mentioned in history, was suspended between two boats moored in a current—though asses and mules had previously, to some extent, relieved Roman women from the eternal toil of the quern. Breast and over-shot wheels quickly met the diversified conditions of motive-fluids.

A canal enthusiast once declared his conviction that rivers were made to supply artificial conduits. Had he said the surface of the earth was broken into mountains and valleys with the view of affording its occupants motive powers in running and falling waters, he had been full as near the truth.

In the case of water we have an early example how, as knowledge increases, man rises from the driving to the superintendence of machines. In the first stages of his career he is of necessity a painful toiler; but as new forces are found out, he exchanges the drudgery of a slave for the dignity of a director. Instead of consuming his sinews and marrow in gross unmechanical strivings, his intellect is brought into action, and teaches him by merely opening a water-gate, or stops of other motive reservoirs, to call into service energies surpassing the combined efforts of thousands of men—to make a gas or a liquid do the work of human machines. He then begins to comprehend that nature has not intended him to labor as a brute any longer than till he learns to manage other energies which she has placed at his disposal. Many ancient people excelled in mechanical arts, but were blind to the application of inanimate motors. Cities and hamlets were located on the banks of rapid streams, from which the weaker sex had daily to bear water for domestic uses—the liquid power meanwhile running unheeded by.

WIND.—At what period wind was first siezed as a servant, no reliable accounts are extant—certainly not as an established one, until animals had long been enslaved. Sailing vessels have been impelled by it since the birth of navigation, but as a driver of stationary mechanism it is supposed to have been little used by the ancients. Be this as it may, they who first drove machinery by aqueous and aerial currents conferred incalculable good on their kind. The species made a greater leap than ever before. To compel unconscious matter to do man's bidding—making gales and gushing torrents pause to labor for him; with an energy, too, surpassing that of living laborers—was a new idea, and one of a higher type than previous millwrights had sought for. That idea and its realization opened the epoch of inorganic motors.

It was natural that the two grand fluids of our earth, the most abundant and palpable, should head the list of the inorganics. Everywhere their efforts were seen and felt, and from the beginning they had courted man's attention. In gentle ripples one would dance before him, and with increasing force run past him; here it swelled and boiled and foamed—and there, with resistless might, swept all before it. In like manner the other constantly reminded him of what it could do for him if he would; whispering in zephyrs as if to persuade him—murmuring in the breeze, then screeching in the gale at his indifference—and now and then resenting his neglect to profit by it, by unroofing his dwelling, or prostrating his forests and fences. A dull pupil, nature has had to flog knowledge into him—to awaken his energies by his necessities—by his fears as well as by his hopes.

Not till water and wind mills were called in to assist him, could man be said to have fairly left semi-barbarism behind him—nay, scarcely that, for the Chinese, the oldest of existing people—the most mechanical, and who have brought down not a few antediluvian arts—have them, and they are not much beyond it.

FORCES ARTIFICIALLY EXCITED

STEAM.—Nature provides in everything for man till he is able to depend upon himself. Her aid is designed gradually to unfold his resources and lead him to rely upon them. Preceding motors he found ready to his hands, but the exigences of advancing society made demands which they could not meet. Progress was to be arrested, or he must discover and render available a new one. In what direction should he turn but to the forces which lay sleeping in inert matter? Of the existence of some he was well aware; of their adaptation to his purposes he had received many intimations, while experience, in rendering available the grosser fluids, prepared him successfully to excite and control some of them. His efforts were rewarded beyond the wildest of his hopes. Steam, the most potent and pliable of motors, has worked, and is working miracles in his behalf.

Whatever may be thought of other ameliorating influences, inorganic forces artificially awakened, will ever be the foremost of the civilizers—the steeds to draw society's car onward; and of them relays are assuredly provided, so that whenever one becomes fully used up, the most made of it, another will be ready for the harness. We see what the first of this class has done—advanced us farther in an age than was ever before accomplished in a hundred. We have run where our forefathers crept. But unparalleled as are the effects of steam, its moral influence is still more precious. In rousing mankind from the listlessness of olden times, it has opened sources of endless acquisitions; has given us a standard more elevated than was before thought of, by which to measure ideas and expectations of the future; raised the screen from before a prospect exceeding in brilliance aught that had been reflected on the mental retina; and established the great truth on which human progress depends—"*when man wills, matter must obey.*"

Thus it is that though few, as yet, and making their appearance after long intervals, the motors are the real sources and true registers of civilization. Marking a regular progression, each elevates man higher in the scale than its predecessor. In their nonage his knowledge is little more than instinct; in the subjection of animals to labor, his intellect awakens, becomes inquisitive as inorganic forces are realized, and since aqueous vapor has become a popular motor, the mental torpidity of previous epochs is in a great degree cast off and inquiry put on the alert in every department of research. That the next which comes in will be attended with results equally marked, there is no room to question.

Every motor is known to add to the value of those that preceded it, either by leading to new properties in them, or by furnishing additional means of economizing and transmitting them, and thereby enlarging the area of their operations.

With steam a change full of promise has come over the world, such as philosophers and statesmen of former times could neither anticipate nor appreciate. Henceforth, nations, aware of their true policy, will strive with each other in conquests over Nature. Her unexplored realms will be invaded, and priority of discovery rewarded with laurels unstained by a tear, and such as angels might covet.

ATMOSPHERIC PRESSURE.

It is obvious that no motor less valuable than steam can be allowed to displace it; still, several may excel it in other qualities, though less efficient on the whole, and these will assuredly be admitted as aids, if not as principals. In looking around for such as are not confined to places—as water, nor to times and seasons—as winds, there is one which costs nothing to carry about with us, and requires not the removal of machinery or materials to meet it. Where man is, it is; go whither he will, he cannot leave it behind him. More faithful than his dog, it is ever at his side; an eternal source of mechanical power, omnipresent, illimitable, constant, free to all people, common to sea and land, easily excited, and of endless application.

And what is this but the bland and silent firmament, which, pressing with the weight of a ton on every foot of surface exposed to it, offers a power adapted apparently to every exigence—one whose intensity can be modified indefinitely—pushing, if we wish it, imperceptibly as the falling dew, and at our nod descending, resistless as an avalanche? The breath of living mechanisms, why should it not become the animating spirit of artificial ones? What is there to hinder atmospheric pressure from being adopted as a common, if not a general motor? Little is wanted to make it one—a cheap and quick process of exciting it being alone required.

The sea is the receptacle of the world's waters, the firmament of its gases. All substances are worn and washed into one, and all exhale into the other. We detect the latter in what are called odorous bodies, and we might do so in all bodies, were it not for the obtuseness of our senses. Had human organs been fitted for micrographic observation, the color and taste of air had not

eluded them. The ceaseless streaming upward of every variety of vapor makes the atmosphere one of the most complex of compounds; yet the mixture is found to be made up of two ingredients chiefly—oxygen and nitrogen, with a very slight dash of water, and a much slighter of carbonic acid—a result, however, of approximate analysis. Further researches will lessen or enlarge the number of constituents, ascertain their qualities as well as quantities, and most likely disclose the means of producing among them instantaneous collapsion; i. e., will enable us to call into instant action the air's pressure on one side of a piston by destroying it at the other.

Could we by decomposition annihilate the air in a given space, or by some quick process displace it, we should have a power adapted to most of the purposes to which steam is applied, and to others to which it is inapplicable; a power as ready to act in a parlor as in a workshop, above the earth as beneath it or upon it, and one which can be invoked to any degree of intensity, from the suspension of a fly to the overthrowing of a mountain. Difficulties in the way present no formidable aspects, but rather court attempts to remove them.

We already know the capabilities of atmospheric pressure, since to it the first steam engines owed all their efficacy, and to it not a few are still indebted. It is scarcely possible to conceive a more glorious source of mechanical force than the soft, invisible, and quiet fluid in which we live and move; attending us everywhere, and ready to obey the slightest invocation, it would seem designed for a universal motor. An object of more legitimate and high ambition no chemist can desire to achieve, than that of economically and rapidly displacing air from a cylinder without introducing another substance for the purpose. Accomplish this, and human drudgery is at an end; ignorance and crime, our race's jailors, loosen their hold on their victims' throats, and slink into outer darkness.

THE OCEAN.

Not only the aerial ocean which encompasses, but the denser one that forms, so large a portion of our globe, is destined to become a laborer for man. Nothing is more fitful in its habitudes and variable in its intensities than wind. It is the symbol of capriciousness, and hence the more reliable and manageable forces of running waters have justly had the preference, and hence millwrights and manufacturers roam the interior for chutes under which to place the buckets of one class of wheels, while they husband brooks for whirling round the floats of others.

There are streams which, throughout their length, drive labor-saving machinery, but they and their accessories are tributaries to ONE in whose presence they shrink into insignificance. Nature, in her teachings, leads inquirers from little to larger things, from particulars to generals. It is so with hydraulic motors. In every branch of philosophy and art, one acquisition clears the way for and hastens the advent of another. Having turned rivers and rivulets upon our motive wheels, the restless ocean itself will in time become subjected to human vassalage, as well as fire, air, earth, lightning, &c. Adapted to ten thousand purposes, to propel all descriptions of stationary mechanism, it cannot much longer be left to expend its momenta in vain. Washing all lands, its shores will become fringed with manufacturing mechanism, driven by ordinary and tidal waves, either directly or through the medium of compressed air, by the gravity of descending or the upward force of swelling surges, probably by all.

Steam cannot be too highly regarded, yet it is costly; atmospheric pressure, too, requires as yet expensive apparatus to excite and employ it; but the waves of the sea are open to the poor, and being restless, are ever ready to work. A simple device, then, by which to transmit their energy to revolving or alternating mechanism, is wanted; and a greater benefactor has perhaps not lived than he who best solves the apparently simple problem. It would be long ere the curtain of oblivion dropped over his name.

Till our times the human mind seems not to have sufficiently matured to attempt the conquest of such a power. There is no reason why it should not now be made to give motion to mills and animate looms and spindles. All force is derived from matter in motion; why then neglect the greatest of terrestrial moving masses? Three-fourths of the earth's surface ceaselessly surging to and fro, rising and falling, rolling on and lashing all shores, and lashing them in vain. It cannot, however, be long neglected. The searching, sifting, and daring spirit of philosophical enterprise will not rest until the chiefest and mightiest of visible motors which God has placed at our disposal be brought into the service of the arts.

There is no hazard in asserting that none of the ordinary modes of employing water as a motor are perfected. An interesting illustration of this is furnished in the reacting water wheel, which, till recently, has been little else than a toy in the lecture room. As exemplified in the turbine, the same principle has yielded eighty per cent. of the power employed, and in some cases is said to have run it up to near ninety: a result almost incredible, and one that strongly admonishes us critically to investigate every source of mechanical force, with a view to its economization. Prime movers are too precious gifts to be but half used up, under the constantly increasing requirements of civilization.

The turbine elucidates a truth which inventors, above all other men, should cherish. It is this: there is no natural force, no matter how discouraging or forbidding the circumstances under which it is exhibited, but what may, by appropriate mechanism, be turned to account. And so far from regretting the supposed difficulties in the way, they ought rather to be welcomed, since they invariably serve as keys to open new doctrines in science and art. In mountainous districts are falls of water far too high for overshot wheels, and in low lands sluggard streams glide on, too inert for undershots; but turbines have been impelled by falls of less than twelve inches, while others are worked under columns varying from fifty to four hundred feet.

EXPLOSIVE FORCES.

Repeated attempts to derive a useful motor from explosive compounds were made during the last century. No devices were matured, not because of insuperable difficulties to be overcome, but principally on account of the increasing popularity of steam. It was doubtful that any competing energy could stand before that agent; but now things are different. Steam engines have been greatly improved and extended, and the arts have reached a point where a more portable power has become greatly desirable. It is only as the requirements of advancing society present new exigences, and such as current forces cannot meet, that we begin to look seriously for others.

Though few have been developed, explosive forces are beyond question multitudinous, and include every imaginable quality and intensity. No systematic inquiry into their various natures and numbers has been undertaken—

it is not yet time for that—nor into the means of drilling them to useful labor. Many persons have supposed them untameable; that their fitful violence incapacitated them for working steadily as other inorganic servants do—an error, certainly. There is no active energy, revealed or to be revealed, no matter how refractory in its habits or paroxysmal in its manifestations, but will be subdued by man. It is his mission to make them all subservients. Give him time. Crumbling Cheops was not raised in a day, nor are the lasting edifices of civilization and science to be finished in a century. Some imagine their spires are already penetrating the clouds, while, in reality, it is their foundation courses only that are laid.

GUNPOWDER.

At periods, too remote to be ascertained with precision, explosive mixtures were used. Of these, gunpowder is best known. Others have passed away, while demands for it have been swelling at a fearful rate—fearful, since it has long been dedicated to destructive purposes, for which it is held of paramount necessity. The scourge of our race, it might have been a chief good; a precious gift of science, it has been prostituted to a purpose the most wicked that man can conceive, or evil spirits suggest.

So common and cheap as powder is, it is difficult to realize the value of a device that locks up the strength of giants in a few quiescent grains, and releases it at pleasure—a power that instantaneously dilates into a space two thousand times greater than it slept in. Instead of projecting missiles of death, it might, if properly employed, extend and refine every enjoyment of life. Had a tithe of the treasure and thought expended during the last three or four centuries on extending the range and effect of fire-arms, been devoted to the application of powder as a mover of machinery, society would probably have been equally advanced as it is, even if steam had not been subdued. Strange as the assertion may appear, gunpowder and its affinities have in them elements calculated to contribute as great good to man, as they have heretofore engendered evil.

Gun-tow or cotton, the first of a new class of explosives, seems more promising than gunpowder. Neat, clean, light, and leaving scarcely any residua ingenious men are already engaged upon it. There is more virtue in a few bales than can be extracted from cargoes of coal and tuns of water. As with gunpowder, it requires no ponderous or complex machinery to disclose and transmit it. Like its predecessor, too, it has been seized by those who without compunction destroy human beings as vermin; and from its applicability to internecine work, it has received its pronomen. Cotton now clothes a large portion of the human family, for which purpose it is held in importance second only to food. If, besides this, it can be made to work for us, to relieve from debasing toil the millions that pass through life, tugging with brute force, straining their heart-strings, and gasping from exhaustion, a halo will gather round the head of him whose inventive skill compels it to do this, that will never vanish.

MEANS OF EMPLOYING EXPLOSIVES.

Some may ask, how are forces which present no transition between quiescence and flashes of rage to be applied? How deduce uniform movements from fits of convulsion; or by what reins are these startling, impulsive steeds to be managed, and by what traces yoked? Answer. Present to engineers a more economical force than any they have, and they will not be long in finding out means of turning it to advantage. Withdraw all they have, except what they could make out of powder and cotton, and few years would pass away ere these were numerous as those in use. A little reflection will show that there is no serious obstacle to the practical solution of the problem. For example—what material difference is there between driving a ball out of a gun and a piston through a cylinder? The apparatus for both are very closely allied—in substance the same. Fasten two bullets to a couple of ramrods, and charge two guns with them—connect the upper ends of the rods with the extremities of a vibrating beam—fire off the balls alternately, without allowing them (by the play of the beam) to pass beyond the muzzles, and you have an engine differing but little from a high-pressure steam one, save in the moving force. A gun barrel is a working cylinder, the bullet a piston, and the rammer a piston rod.

In what manner neutralize the violence of such motions? By adapting the charge to the resistance, so that no more force be excited than can be turned to account. How bring the rushing ball or piston gradually to rest? (For, unless that is done, no machine could long withstand the shocks of pistons shot through cylinders). By making the upper parts of piston rods themselves into pistons of air condensing pumps, that when forced into their cylinders, the increasing resistance from the compressed air may bring them by degrees to rest—the subsequent expansion serving to drive them back to receive a fresh charge. In this way a reciprocating movement of one or more pistons may be safely kept up, and a continuous rotary one derived from it by any of the numerous methods of conversion.

Such examples may suffice to explain the practicability of explosive motors. There are few ingenious men but could devise several modes of employing the force of a ball, or of powder or cotton without it. Difficulties of construction and arrangement are nothing in the way of securing a good prime mover, whenever attention is fairly drawn to it. Every defeat with true genius is a *point d' appui* on which it plants itself to overcome new obstacles.

ELECTRIC MOTORS.

The belief is a growing one that electricity, in one or more of its manifestations, is ordained to effect the mightiest of revolutions in human affairs. In subtlety and power, in excitability, rapidity, and intensity of action, there is nothing like it. Its complete subjugation may be held as the climax of conquests in art, the apex of ambition in science—so blessed and boundless, so surpassing all anticipations, are the seeming results that must follow. When, in addition to what it is now performing as a messenger—one swifter than those of the gods, and more reliable than the boasted Ariels of poets—it can be drawn cheaply from its hiding-places, and made to propel land and water chariots, animate manufacturing mechanisms, become an agricultural laborer, and a household drudge of all work, then we may begin to think the genius of civilization is vaulting rapidly toward the zenith.

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Several years ago the discovery of *Electro-Magnetism* awakened sanguine expectations that in it would be found a prime mover so compact and energetic as to be adapted to general purposes. No sooner was the fact made known, that soft iron is rendered intensely magnetic by the galvanic or voltaic pile, than hosts of mechanicians in both hemispheres were at work endeavoring to transmit the enormous power thus developed to motive machinery. Though exhibited in a variety of apparatus, the principle by which motion is obtained from it is the same in all; one or more magnets are *fixed* and serve as fulcra on which others turn. Thus Professor Henry first produced reciprocating motion, by arranging an electro-magnet in the manner of a balance-beam above the opposite poles of two permanent magnets—keeping up oscillation by alternately breaking and renewing the connection with the battery.

Rotary motion is attained by so arranging two circles (or portions of circles) of magnets, one within the other, that the faces of those which revolve may sweep round those that are immovable, and as near as can be without touching. By a series of cut-offs, the stream of electric fluid is alternately let on and excluded, so that each face of a revolving magnet is pulled in succession toward each of the fixed ones, and as it passes is pushed away toward the next.

While in some machines permanent are employed in connection with electro-magnets, in others, the latter are only used. Change of polarity is abandoned in some, and with it the repellant force; the bars being rapidly magnetized and de-magnetized by opening and closing their connection with the battery.

In 1838, Jacobi propelled a small shallop with fourteen men, on the Neva, at the rate of four miles an hour, three against the stream. He had four fixed electro-magnets, and the same number of revolving ones, to which the axle that carried the paddle-wheels was attached. His battery, consisting of sixty four pairs of platinum plates, each presenting a surface of thirty-six square inches, was charged with nitric and sulphuric acids, on Grove's plan. Since then innumerable modifications of the apparatus have been devised; lathes have been worked, and articles of wood, ivory, and metals, turned; a printing press operated, and a locomotive weighing five tons propelled, &c., &c., But these experiments, interesting as they certainly were, have brought out no marked results, nor afforded any high degree of encouragement to proceed. It might be imprudent to assert that electro-magnetism can never supersede steam; still, in the present state of electrical science, the desideratum is rather to be hoped for than expected.

Great, however, will be his glory who in the face of these discouragements succeeds.

The difficulty is not in the mechanism for employing the force, but in the extremely short space through which it acts. This is so limited that the phenomenon may be considered something like the converse of cohesion: *e. g.* an electro-magnet with its armature in contact, had a lifting power of 1,700 lbs., but when the armature was removed one eighth of an inch, the weight supported was barely 15 lbs. The interposition of a film of tissue paper has reduced the power one half. By making a soft iron core play in the centre of a helix—like a piston rod minus the piston playing in its cylinder—an apparent increase of range is obtained, a stroke of twelve or more inches realized; but this is supposed to be colorable rather than real.

At the present cost of metallic fuel, electro-magnetism cannot become *commercially* valuable, nor in any of the ordinary applications of steam can it come into competition with that agent—not even if the requisite acids could be had for nothing, since there is more virtue in a pound of coal than in five of zinc.

Either the science is not ripe for application, or experimenters have not got on the right track. It is not devices for transmitting the force that are wanted, but means of extending the range through which it acts. Should this be obtained, readier and cheaper means of exciting it will probably follow.

The talent for inventing new modes of employing forces is great, but that of discovering new motors, and applying them to the general purposes of engineering, is far greater. One is somewhat common, the other rare. A new power is now wanted, is looked for; and what a field of enterprise will its introduction open! Every department of mental and physical existence will be benefited by it. Steam has wrought gloriously, and equal changes for the better will be wrought by that agent which displaces it, or which takes a place beside it.

ATMOSPHERIC OR COMMON ELECTRICITY.

There are indications of a law by which every motor must come in its own order. If it appears before its time, it will partake more or less of the character of an abortion. It will be imperfectly developed, its habitudes not understood, and the means of controlling them, wanting. This was the case with steam, whose mechanical properties the ancients detected, yet they were not prepared for it. In their hands its application was confined to trifles, and even for them soon laid aside. Such was the case with explosive compounds also, and to some extent it is the case now with electricity.

That this piercing and potent energy is ordained to play a prominent part in the arts as it does in nature, is all but certain; perhaps as multifarious in its operations too. Already, it separates metals from their ores, and gilds our plate; in telegraphs, it annihilates time, and in electric clocks, measures it: as an element for artificial illumination, it is now being courted, and may, at no distant day be used to light up the atmosphere over cities, in place of myriads of petty tapers. For other purposes also, the most sagacious of spirits are endeavoring to subdue it.

But, if inorganic motors are to come in their turn, that is, according as preparations are made to receive them, or, in other words, not until a previous familiarity with their natures has fitted us properly to apply them, it is hardly to be expected that we should so soon realize what seems to be the highest, and which, of all earthly things, we, as yet, know least about. It is the part of philosophers to reveal principles—of mechanics to apply them; but philosophers, as yet, know little more about electricity than do artificers.

While some are sanguine of soon yoking this invisible steed in material traces, and compelling it to work as do grosser motors—others incline to the opinion that the chief of earthly conquests is not to be made so readily. Certes, when electricity is brought into man's service as a common worker, all that may come after must needs be subordinate. When this ubiquitous, exhaustless, imponderable, incorruptible something—agent, spirit, substance, or whatever it be—becomes so far subdued, men will have progressed, one would suppose, beyond terrestrial, and entered upon celestial physics.

The pursuit is, however, a legitimate one, and neither repeated nor long-continued failures can be attended with dishonor. Success is a matter of

time—if not now to be attained, it will be—must be. The difficulty with electro-magnetism—the short distance through which the force is felt—belongs, not to the ordinary phases of the fluid in Nature's exhibitions. She causes it to act through greater spaces than can ever be required in the arts; and as a further inducement for us to persevere, she shows its energy under circumstances where it might have been least suspected—circumstances it were well for inventors to study: we must first understand her operations before we can successfully imitate them.

Pervading all things, nothing is, and nothing moves without it. Recently, it has been detected issuing in showers from rushing steam; while a thimbleful of water is known to contain enough to shake both earth and heaven. Its dynamic effects are seen in leagues of prostrated forests—at other times in unroofing and overthrowing dwellings: its expansive power in splitting rocks and trees into shivers; sometimes, too, in forcing outward the sides of buildings. Three years ago, the stone steeple of a church was burst asunder during a thunder storm, the walls being dispersed in every direction. One hundred tons of stone were blown to a distance of thirty yards, in three seconds—exhibiting a mechanical force calculated to have exceeded that of over twelve thousand horses.

A power that does these things, and greater, only wants to be understood to make it turn our carriage, paddle, and mill wheels. There is enough to turn them for ever, can we but find out the means to tame it. It is sound philosophy, that all the mechanical performances of nature (not excepting that of lightning) are imitable, and also applicable to human purposes.

To show us what else it can do, Nature diversifies the experiment thus: thrusting down a portion of a cloud in the form of an elongated tube, till the orifice approaches the surface of the sea, tuns upon tuns of water visibly ascend into the nebulous reservoir above. When this is filled, the strange duct gathers itself up to its parent body, and, then the whole is borne away to fill the pitchers of Aquarius. Here we have the phenomenon of water beginning to boil and leap as the hose descends, impatient as it were to rush through it. When engineers become *au fait* in repeating similar experiments, overshot motive-wheels may become as numerous in deserts, as by the sides of rivers. In water-spouts, the process is open to observation from beginning to end—still it is an unsolved problem.

To conclude:—Notwithstanding those of bygone and the more successful inquiries of recent days, but exceedingly few of her secrets have yet been drawn out of Nature. Environed by her, it is but little that is comprehended of what she is doing above, beneath, about us; yea, with us and within us—little of the grand scheme of creation and of the principles and processes at work in it. Our wisest men are but pupils in normal schools—freshmen in their rudiments. True, we know much compared with the deplorable ignorance of the past, yet what we have acquired is only the A B C of either science or art. Those who fondly imagine the arts at their culmination, and steam the last of inorganic motors, would shrink with awe, could they contemplate the grandeur of human destiny, in an epoch of which our day is but the dawning.

And, certainly, whoever confers this splendid gift of a new motor on the world, will be ranked with the noblest of earth's sons. The goal is a tempting one, and the more so since the keenest spirits in two hemispheres are striving to reach it. We are ignorant who will receive the crown, but we know who will not, viz., those who pay divine honors to pelf, and whose aspirations never soar above the common objects of vulgar ambition. Generally, the rich revelations of science are made to those who love them for themselves, not for what they can be sold for. They come down to those who seek them, who, by industrial study and research, struggle to find them out, and who prize them when found, as expressions of Divine thoughts for the good of the species.

For months past, crowds have been hastening across every latitude, on their way to the newly-discovered realms of gold. An epidemic rages to gather and hoard that, which, except as a symbol, has little more value than its weight of inert sandstone or granite. A people's treasure is in useful labor; there is no wealth, and can be none but what it creates. Every good, great or small, is purchased by it. Savages with boundless territories and fertile lands, are indigent and often destitute because they work not. A single day's labor of a peasant or a mechanic, tends to relieve human wants and increase human comforts. It produces that which is not to be had without it, and to which tons of glittering ore can contribute nothing. In fine, there is no wealth but labor—no enjoyments but what are derived from it.

But, to those who are ambitious of ennobling themselves and really enriching their country, *placers* inexpressibly more precious than any to be found on the Sacramento, are invitingly open. Let them dig in THE MINES OF THE MOTORS, and they will bring to light, active, fruitful, and everlasting sources of true opulence.

VI.

PROPOSED APPLICATIONS OF THE PATENT FUND.

I. PUBLICATION OF THE SPECIFICATIONS AND DRAWINGS.
II. PREPARATION OF A GENERAL, ANALYTICAL, AND DESCRIPTIVE INDEX OF INVENTIONS.
III. INSTITUTION OF NATIONAL PRIZES.

PROPOSED APPLICATIONS OF THE PATENT FUND.

Of the disposal of the Patent Fund, patentees have ever been jealous; but if they have complained of drafts made on it to subserve other interests, it was because of their anxiety to have it expended in such a way as to meet the cordial assent of all classes of society: one associated with the interests and honor of all.

The Patent Office is a self-sustaining institution: its receipts exceed its expenditures, and have exceeded them for several years. The surplus money paid in by inventors, and known as the Patent Fund, amounted on the 1st of January, 1849, to \$216,468$\frac{33}{100}$. Of this sum \$50,000 were appropriated by Congress at the last session toward defraying the cost of the additions to the building, recently commenced, and have been withdrawn on that account—a diversion of the funds which is believed by inventors to be unjust.

These additional structures are not required for the proper business of the office, but are intended to accommodate other branches of the government, and those better able to pay for them. After contributing \$108,000 to erect the present building, it is deemed manifestly wrong to absorb what has always been considered the inventors' own fund, to increase the facilities of other departments. When the upper saloon of the present building (more than one third and by far the best part of the whole)—temporarily occupied by the collection of the Exploring expedition and the National Institution, is restored to the office, on the completion of the Smithsonian Institution to which the collection is to be removed—no further accommodation as regards room will be required by this bureau. The undersigned therefore asks, in the name of the inventors of the Union, a restoration of the sum withdrawn, and authority to devote the fund to purposes more immediately connected with the progress of science and art. The amount of the Patent Fund, January 1, 1850, was, as already stated, \$169,505$\frac{17}{100}$.

The fifth and sixth sections of the act of Congress, establishing the Smithsonian Institution, provide for the "erection of a suitable building for the reception and arrangement, upon a liberal scale, of objects of natural history, including a geological and mineralogical cabinet."

In the first annual Report of the board of regents, it will be seen that a building was commenced with this view, a part of which was specially designed, and has been constructed, to receive the "National Museum," which includes the collections now stored in the upper saloon of this office.

The building is so far advanced, that it is believed if ordinary effort be made, the rooms designed for the Museum can be sufficiently completed to receive the collections in the course of the present year, (1850,) when the hall which they now occupy may be restored to the office for the display of its models.

It is most desirable that Congress should act on this matter at the present session, since the cost of finishing the buildings now commenced, and the remainder contemplated in the original plan, will require appropriations, it is understood, to an amount varying between five and six hundred thousand dollars—so that, if the Patent Fund is to meet the demand to the utmost of its ability, it will be wholly swallowed up, and the cherished purposes of inventors with regard to it entirely frustrated.

There are several essential desiderata to make this bureau what it ought to be, and to some of them the Patent Fund, in the opinion of the undersigned, should chiefly be dedicated. Probably by no other channels of expenditure can the public and inventors themselves be so *immediately* and *enduringly* benefited—by none can more certain and rich returns be realized. Among them are—

I. PUBLICATION OF THE SPECIFICATIONS AND DRAWINGS.

In several respects this bureau, in its organization and practice, is in advance of patent offices in other countries. According to antiquated fooleries about "divine rights," by which everything belonged to kings and nothing to the people—not even the fruits of their ingenuity—inventors abroad still pray for and accept patents as "special acts of the sovereign's grace." With us the insulting and debasing proposition is effectually ignored. Not subjects, but freemen, inventors here claim and receive patents as of right—their own right.

Nor are they subjected to the claims of numerous offices, at each of which the ingenious of some lands are required to call and pay enormous fees for no services rendered,* or for services next to none, ere the royal permission

* This practice, and also one relating to legalized "expedition fees," are elucidated in the recent report of a committee appointed to inquire into the British Patent Laws, with a view to their improvement and the removal of abuses.

"After the patent bill is prepared, the patent is forwarded through the Signet and Privy Seal offices? Yes. That part of the proceeding is regulated by the statute of Henry VIII., is it not? Yes, *entirely, and which was passed for the purpose of creating fees*—the 27th of Henry VIII., chapter 11, which requires that every patent should be brought to the clerks of the Signet and Privy Seal, and go through certain stages. Up to that stage, I believe, it is a matter of practice which the particular offices could control. From that stage it is a matter regulated *by an act of Parliament, passed simply for the sake of the fees, and is a very great hardship.* If you have two names, you have the expense very much increased—three, and so on, without any corresponding benefit or protection; in fact, the offices are absolutely useless.

"Is it not stated in the preamble to that statute, that the object is to increase the fees to the clerk at the Signet and the clerk at the Privy Seal Office? Yes—it states that the clerks of the Signet and Privy Seal give their daily attendance for great and weighty affairs, and have no fees, 'other than cometh and groweth of the said Signet and Privy Seal.' And that statute was passed simply as a means of paying the clerks, by requiring every grant to pass through their hands. They receive fees which are not specified on those grants."—*Evidence of Thomas Webster.*

"Are the proceedings at the Signet Office and the Privy Seal Office anything more than formal with regard to new inventions? *Nothing more than formal*, but they are dilatory. Great complaint has been made, and with reason, at the confinement to one seal-day in the week. The rule is to deposite the bill on Thursday at one o'clock in order to be in time for the seal on Friday. If it passes over one o'clock on Thursday, it is delayed a week. The Privy Seal, however, may be obtained in a day, *on payment of five guineas as an* 'EXPEDITION FEE.'"—*Evidence of William Spence.*

for a patent to issue can be obtained—a part this of that gigantic system of wrong by which the industrious have been taxed to support the vicious and idle—a system originating in times when the masses were acknowledged serfs, and cherished till it pervaded every industrial profession, and hung, as it still hangs in many lands, a dark spectrum overshadowing human enterprise.

Our example in establishing a single and a moderate fee, and dedicating whatever surplus funds may accrue to the benefit of those from whom they were received, has awakened inquiry abroad, and led to comparisons and investigations which promise to result in modifications of exactions that have often reduced genius to beggary, and legal technicalities that have sent not a few of earth's purest spirits to harbor with maniacs. Any step toward the freedom of the arts—the universal emancipation of ingenuity—is matter of rejoicing to the friends of progress, be it taken where it may.

In our extended Union one patent covers every state; but with some governments an invention, although new to every part of the country, can only be secured for the whole by taking out separate patents for separate sections—a practise acknowledged to have been instituted, and still clung to, for the purpose of extorting from inventors additional fees.

A foreign journalist, representing a city deeply interested in manufacturing improvements, "regards with satisfaction the recommendation of the committee on the Signet and Privy Seal Offices, to abolish the system of enforcing, for the sake of fees, separate patents for each of the three kingdoms."

"Any one," says the writer, "who is accustomed to glance at the pages of our scientific, and particularly of our mechanical serials, must be struck with astonishment and admiration at the inconceivable ability, manual skill, and even genius, continually striving to urge on the wheels of material improvement. There is no scheme too brilliant or too daring, no difficulty of execution too intricate, to baffle or to daunt them. In the air, the water, and the earth, these spirits are continually toiling, wasting health, and strength, and means, in some effort or another. It is little enough that when the object is attained, some interloper should not be suffered to step in, appropriate the invention, and intercept the profits. The law has wisely pronounced that enterprise shall have its reward in fourteen years' monopoly of any new and original invention. That is not much, but public policy will allow no more. It has always, however, been a hardship that an extravagant expense is requisite to procure a patent. Separate writs must be taken out for England, Scotland, and Ireland, and hundreds of pounds are swallowed up in procuring them. Not seldom a poor man is obliged to resign all the profit of his discovery from pure inability to take out the protection. That ought not to be; and no sophism has sufficed to convince us that any expense beyond the minimum possible cost is advisable in such cases. It is indeed said, that the charge prevents the inventors of trifles or insignificant plans from taking out patents. But it is as likely to prevent a very different class. It is a test utterly unsatisfactory in every respect, and should not be suffered to exist, especially when the abolition of protective laws has placed our own skill and industry in competition with those of the whole world. We therefore look with satisfaction on this recommendation."

The superiority of our system consists also in the rejection of intricate legal forms, so that every inventor of ordinary capacity may make out and pass through the office his own papers, without the intervention of attorney or agent:—also in the requirement of models, and their free examination—in the information and advice, verbally and by circulars, gratuitously given—access to the office library—and in the practice of examining into the novelty and value of devices and discoveries for which patents are asked. Not a week elapses without ingenious men being prevented from spending their money on patents, by what they see and learn here. Every applicant in person is advised to look through the models, examine the specifications and claims on file, and the published reports of the office, before making application: it is perhaps superfluous to add that many who follow the advice see they are anticipated, and make no application at all. Surprised to find themselves on beaten tracks, instead of ranging, as they supposed, through untrodden fields, they have their attention turned to more promising directions, and a future waste of time and means prevented. But few inventors can afford the expense of travelling to and from the capital to make such inquiries.

But after all that can be said in favor of our practice, in one essential particular we are in the rear, viz:—*In the publication of descriptions and drawings of inventions patented.* No greater boon could be conferred on inventors than an annual volume or two devoted to this purpose. For want of such a work, an incalculable amount of intellectual and physical effort—of time, money, material and ingenuity—has been wasted within the last twenty years; while every day is adding to it and to the number of those who spend the best part of their lives in devising and maturing what has already been done. In no country do the ingenious labor under the disadvantage to so great a degree as in ours, although in none can sources of information be of more immediate and lasting benefit.

The publication of the specifications and drawings of patented inventions has for many years been practised in England, France, and most of the European states, as a part of the general system, legalized, for the protection of inventors and the encouragement of useful arts. In England the publication is conducted by private enterprise; but in most other European states, it is obligatory, sometimes on the patentee, and sometimes on the government. From the etymology of the term, *Letters-patent* are letters which lie open; and in law the grant of the same is equivalent to publication; but in effect it is hardly so, as the archives of public offices are difficult of access, and the parchment in the hands of its possessor, is generally a sealed document to the world. The insertion, therefore, of suitable descriptions and illustrations, in some public journal, is necessary, to apprize the public of the progress of inventions, to prevent infringements through ignorance or mistake, to avoid occasions for contests about priority of invention, and to save inventors the trouble and expense of wasting their energies upon what has already been secured to another. It also stimulates improvement, and awakens commendable emulation.

The following is an extract from the patent laws of Bavaria. Article 59. "Extracts from this Register [the official register of patents] ought to be inserted periodically, in the most widely-circulated gazettes, in the journals of industry, and in the advertising papers of the provinces. The Minister of the Interior ought to take care that the most extended publicity be given to the description of the objects invested with a patent, immediately after the expiration of the first three years—to be computed from the day of publication of the patent granted—in order to contribute the utmost possible to encourage the spirit of invention and extension of industry.

"The publication of discoveries, &c. at the term above fixed, can not be

postponed by the Minister of the Interior, but in extraordinary cases, and for well-grounded reason—the patent sufficiently protecting the patentee against the infringement and violation of his privileges."

In some of the European states, the publication is not ordered until the expiration of the patent, that the public may then be informed of what has become their property. In others, advertisement or publication is enjoined upon the patentee immediately after his patent is secured.

In the following countries specifications and drawings are published at the expense of government:—

Bavaria—three years after the grant.
France—after the first annuity is paid.
Belgium—after the expiration or forfeiture of the patent.
Netherlands—same as in Belgium.
Wurtemburg—optional with the government.
Roman States—after expiration.

In some cases all patents are published; in others, it is discretional with the minister; and, in others, certain inventions or classes are directed to be withheld.

The bill for the amendment of the patent laws, introduced at the last session of Congress, proposed to authorize the Commissioner of Patents to publish such specifications and drawings as might be deemed expedient in the Journal of the Franklin Institute.

The importance of some medium of communicating to the public full descriptions of patented inventions was urged upon Congress by Messrs. Ellsworth and Burke; and its attention to the subject is again invited.

II. PREPARATION OF A GENERAL, ANALYTICAL AND DESCRIPTIVE INDEX OF DISCOVERIES AND INVENTIONS:—

An urgent desideratum in mechanical literature—the want of which is increasingly felt, day by day. Expensive as it will be, the world of inventors must have it. Of sufficient moment for the joint undertaking of enlightened nations, every people should feel the duty of contributing their appropriate share to a *précis* of the arts, science, and manufactures of the planet; a work that, above all others, would elucidate and serve to perpetuate the essential and progressive elements of civilization. It is due to remote posterity, that an account of what has been done, up to our day, should be transmitted, that it may be known how far the intellect of the species had expanded in the nineteenth century—to what extent the real sources of physical and mental elevation had been disclosed, and how far turned to account.

How much useful knowledge is lost by the scattered forms in which it is ushered into the world! For want of a condensed exhibition of what is known, how many solitary students spend half their lives in discovering what had previously been repeatedly ascertained! This thought, or something like it, of Buffon, is vastly more applicable to inventors than to *littérateurs*—to our times than his. Knowledge is increasing at an unprecedented rate, but not near so fast as the means for circulating it. New books are being multiplied by tons, new thoughts, comparatively, by scruples; so that unless measures are taken to gather together and condense the useful matter in printed sheets, most of it will be lost by dilatation;—the best ideas will become diluted, and, at length, drowned in oceans of words.

An American section or chapter of the proposed compilation, would be of

high and immediate value to this office, and to every inquiring mind in the Union. A gift also to the ingenious of the rest of the world, it would be acknowledged by similar presents sent us in return. With the information it should contain, applicants for patents would become their own examiners. Each could put his hand at once on what might otherwise require years to find, if found at all. Hence, before embodying his conceptions in expensive forms, he would ascertain their novelty, or want of it, and be led to proceed with confidence, or to abandon or modify his schemes.

However serviceable to applicants the appointment of examiners has proved, the system of search is necessarily defective for want of such a work. It is impossible in every case that comes before them, to wade through the numerous treatises, journals, foreign and domestic, encyclopedias, &c., and the piles of specifications and caveats in the office—their whole time would not suffice for this; yet to arrive at a safe conclusion, the contents should be known to them. Patents have been issued for devices already figured and described in popular journals. A general and analytical index only can prevent this. For want of it, the labors of the examiners result in no permanent advantage to the public, the office, or to inventors, other than those on whose inventions they pass. No results are recorded; and hence (except when the memory of an examiner supersedes the necessity) the same routine of reference to serial and standard works, to models, specifications, &c., is without ceasing, repeated.

The process is not unlike that of supplying water to cities located on the banks of rapid streams, by ladling it into vases borne through the streets on the heads of men and women; while, with the contemplated lexicon, it might be likened to the more philosophical and cheaper one of making the current itself send the fluid through tubes into every room of every dwelling, instead of hiring people to bring it by driblets in. A sum equal to one year's salary of the examiners ($16,000) would go far to bring about the change; the work once completed, fully posted up, and a copy placed in every city, town, and district library, would in each place be a fountain of knowledge to which inquisitive spirits might ever have recourse.

It would save half the examiners' time, and supersede three-fourths of an irritating correspondence, arising from disallowed claims. Till it is undertaken, the examining corps will have to be increased with the increasing business of the office; when done, no such reinforcement would be wanted.

It would be difficult to overrate the saving of time, money, material, and mental expenditure that would accrue to the country if the ingenious had the means of readily ascertaining what has been done in the lines of their speculations. A very inadequate idea may be gathered from the number of applications for patents rejected and suspended yearly for want of novelty or merit. In 1848 there were 968; and in 1849 over 1,400. Yet cases that come under the notice of this office constitute but a small part of the labors of those who sacrifice years in unfruitful researches, for lack of information which an index of inventions would give them.

In a pecuniary point of view, such a work is therefore most desirable to this office, to inventors, and the public at large. When made accessible to popular reference, it will be the saving of millions. No state paper could surpass it in importance, nor in lasting value.

Till it is done, a majority of applicants for patents must continue to meet with sore disappointment. The only safe rule with them is always to make themselves acquainted with what has been attempted, before incurring any

serious outlay. They should never presume that their devices have not entered other heads than their own, until, by a searching inquisition on every hand, the presumption remains in their favor, unimpaired. No better advice than this can be given them. But how are they to follow it? Nineteen twentieths have few or no reliable sources of information within their reach; and not one in a hundred can afford the expenses of a visit to Washington, and a residence there, for the purpose of consulting the office records and library.

When such a work as the one contemplated shall be compiled and put in print, patents for perpetual motions will cease to be asked for. Those then inclined to follow these phantoms would see that others had pursued them through the same deceitful tracks as they themselves. But the rule of the office is now to decline an examination of papers relating to such devices, unless accompanied with working models, that power-generating machines may no longer impeach their specifications—a rule really favorable, though seldom acceptable to applicants, since it requires them to solve the impossible problem before spending their money to patent it—in other words, requiring them to exhibit a machine actually giving out what was never put into it.

If Congress decide that the work shall be undertaken, it should be confined to American discoveries and inventions, at least till they are collated, including of course, patented devices, up to the time when the regular publication of specifications and drawings is begun. Both for economy and utility, the descriptive matter should be concise and expressive—pages should be compressed into lines. When illustrations are required, a few strokes of the graver would, in hundreds of cases, be enough with, and often without, a dozen lines of letter press.

It is evident that the work should be placed in charge of a person or persons peculiarly fitted for it by previous habits and studies. Much care and consideration should be exercised in definitely determining on the plan and details. Not less than three individuals could be advantageously occupied upon it—the compiler, an assistant, and a draughtsman. Essential aid might be contributed by the examiners. I respectfully propose that six thousand dollars be appropriated from the patent fund for the purpose of beginning the work, and that the same amount be authorized to be drawn yearly to continue it, till otherwise ordered by Congress.

III.—INSTITUTION OF NATIONAL PREMIUMS FOR NEW DISCOVERIES, ETC.

The present times will ever be memorable as the opening era of the inorganic and latent motors—one that has brought with it a knowledge of the true destiny of man, which has sent its influence throughout the entire circle of human pursuits, and immeasurably extended human prospects. With it has come the true interpretation of creation's pages; for the arts and science, so long neglected, are now recognised as "rivers of life" to an otherwise sluggish and sterile world. Civilization, which before was a stagnant lake, now pours out fertilizing streams that widen, deepen, and grow more rapid as they advance.

It is our duty, above that of all other people, to assist in this renovation of the race. To profit by our privileges as we ought, we should surpass others both in science and art; for what are liberal institutions worth, if they enfranchise not and enrich not the soul? Deliverance from external thraldom is only preliminary to intellectual emancipation, in which freedom's divinity is ultimately to be felt.

To foster the development of new discoveries in science and improvements in the arts should be among the acknowledged aims of legislation. Assuredly no subjects connected with sectional, national, or mundane advancement, with the progress of a people or the species, with the lowest or highest purposes of existence can compare in importance with them.

The question arises—How is this to be done?

Among the people of old there was one that played their part in the world's drama with such spirit that the sympathies of every succeeding age have been with them. Remarkable for original and vigorous thinking, they were surprisingly active and ingenious. Imagination in them was not crippled by superstitions nor obsolete forms of thought entailed by proclamation and statute. They thought better than their contemporaries and indulged in higher aspirations—results of their political organization. The freest of civilized people, they were necessarily the most inventive. To what else are we to ascribe the purity of taste and brilliancy of genius displayed in the arts they most cherished? The seat of science and of freedom, republican Greece shines in history, a star amid general gloom.

In one thing we are clearly behind her, viz: In the inducements held out to her aspiring sons to make themselves worthy of her. No higher proof of the superior wisdom of her statesmen perhaps can be quoted, than an institution which for a thousand years urged her citizens to attempt noble deeds, or what were then deemed such.

The programmes and fetes of the Olympian games furnish a principle by which all people, imbued with the appreciation of true national glory may profit. Deemed to have done immortal honor to their country, successful candidates were crowned with chaplets, their portraits were suspended in temples, and their statues erected in public walks. To perpetuate their fame, their names were recorded in archives; stipends and often salaries for life were settled upon them; and further still, altars, and even offerings, were dedicated to them as to demigods.

If history is written for us to profit by its examples, why not organize something of the kind in honor of a better class of aspirants? Can we not elicit and maintain as generous an enthusiasm in the furtherance of the useful arts as did the Greeks of old to cherish pre-eminence in muscular performances? There is a wide difference between physical accomplishments that expire with the individuals, and permanent inventions which yield lasting happiness to society—and there should be some difference in their rewards. We have a political Olympiad; why not add to it an institution to foster emulation among a higher order of Olympionices—of men whose peaceful exploits reflect honor on the country and age they live in?

How is it that while all the world has endorsed the apothegm—'Honor fosters the arts'—we have not been anxious, like people of old, to put it to use? The fact is, most of our maxims are learned by rote; they are sometimes on our lips, rarely in our memories. We give a hollow assent to sententious truths, which, when they are most wanted, are least thought of; and naturally, because of their pith not being seen nor their force felt.

As yet less has been done for inventors by government here, than has been accorded to them in other parts of the civilized world. In some they have their statues, and are in other respects honored. An effort is now made to wipe away this reproach—not by soliciting money from the treasury, nor putting the public to any expense whatever,

INVENTORS' PREMIUM FUND.

Under the conviction that Congress will not deny to the class of citizens from whom the Patent Fund has been received, the accomplishment of their wishes, and believing that the following proposition will meet the approbation of the wise and good of all classes, and be consistent with sound policy, the undersigned suggests that ONE HUNDRED THOUSAND DOLLARS of the Patent Fund be held sacred and intact as a permanent Inventors' Premium Fund: from the interest of which, rewards in money may be distributed once every four years, for the most important additions to science and the useful arts.

It is presumed that the most parsimonious could not object to returning in this way a portion of surplus money to those who paid it, upon the condition of the public receiving for it a new and increased value. The proposition, denuded, is simply one asking of Congress permission for the ingenious to promote the honor and interests of their country at their own cost.

Rich beyond all preceding ages, the present one has witnessed accessions to mechanical philosophy that are revolutionizing human affairs and extending human hopes far beyond the horizon which bounded ancient vision. To assist in further disclosing the resources of science and art, is so consonant with the aspirations of American genius, that the consecration of the sum named to this purpose would certainly meet with general approbation.

At six per cent., the accumulative interest during four years on $100,000 would amount to $26,247 69, which sum might be awarded quadrennially in sums proportioned to the merits and magnitude of the discoveries and inventions submitted for premiums.

At seven per cent., the amount would be swelled to $31,179 60.

To carry out the plan, a board of examination and award would be desirable. It might consist of thirteen members, and be made up thus: the Secretary of the Interior; the Commissioner of Patents; the Superintendent of the Coast Survey; the Secretary of the Smithsonian Institution; the Professor of —— of the Military Academy, West Point; the President of the National Institute; the Director of the National Observatory.

The remainder selected from the philosophical and mechanical associations in different sections of the Union, such as—the President of the Mechanics' Association, of Boston; the President of the Mechanics' Institute of New York; the President of the Franklin Institute of Philadelphia; the President of the Mechanics' Association of Baltimore; the President of the Mechanics' Association of Cincinnati; the President of the Mechanics' Association of Charleston, S. C. Or such other institutions might be represented as the wisdom of Congress may direct.

Assembling in Washington a sufficient time before the day or days for distributing the prizes, it would be their duty to examine the subjects offered for premiums, ascertain their merits, and determine the amounts to be awarded to the author or authors of each.

The reputation of such a body of men would, it is believed, be a sufficient guaranty against the introduction of favoritism, or any other unworthy motive of action. Above all personal and political influences in making the awards, their decisions could hardly be other than such as the public would approve. The eyes of thousands and tens of thousands would be on them; their verdicts would be subjected to general criticism, and be applauded or condemned by the world. Guided by inflexible justice, they would be respected and revered as were the twelve who presided at the great quadrennial festival at

Elis; and eventually the honor of a prize would be more sought for at their hands than the value of the prize itself.

A genuine inventor cares little for what the world calls wealth. Mammon is not the first nor the final cause in his philosophy. Ambitious of disclosing new facts, let him bring in fresh contributions to the stock of mechanical discovery, and the treasures of India are nothing to him—and in reality *are* nothing in comparison with the riches he reveals. With him it is an affair of honor more than of profit.

The 5th day of March—the day following each Presidential inauguration at the capitol—it is presumed, would be a suitable one for the presentation at the Patent Office of the premiums to successful competitors. Should the project be sanctioned by Congress, the first presentation might be announced to take place on the 5th of March, at noon, of the year 185–, under the direction of the Secretary of the Interior, to whose department the Patent Office belongs.

By associating these scientific festivals with the beginning of each administration, the occasion of awarding the premiums would be heightened in interest, and be witnessed by citizens from every section of the Union, and also by strangers from abroad. Appropriate addresses by distinguished citizens might form part of the ceremonies. We should thus hold a kind of political and scientific Olympiad, celebrated with fetes in unison with the age—with competitions between intellectual instead of physical athletæ.

Those bearing off the chief prizes under each administration would have their names associated with it on the pages of history—for history henceforth is to be that of beneficent rather than destructive achievements—and of some of them, also, it perhaps will be said, "The honors of genius are eternal."

Should the whole sum at the disposal of the board at each period of distribution not be used, from the want of sufficient importance or merit in the devices or discoveries submitted, no inconvenience could result, since larger amounts would be on hand to meet extraordinary claims on subsequent occasions.

Once established, and its beneficent effects experienced, accessions to the fund would in all probability be received in donations and bequests of patriotic citizens, of whom not a few would find it a congenial medium for promoting by their surplus wealth their country's glory.

A system of national prizes, thus established, would, it is believed, create an epoch in the history of American arts, and would cherish in the largest and most laborious class of citizens an ambition, with impulses as pure as any that move the human bosom. It would do more, for it is such things that contribute to the prosperity and duration of nations. It is well enough to talk of the penetration of prominent statesmen and legislators of old, but not one of them perceived the true means of elevating their people. The producing classes they despised, and the industrial arts were deemed beneath them.

Had premiums been offered at Olympia for useful discoveries in science and art—had they there brought out grist and saw mills, spinning frames and power looms—their names had come down in substantial forms, and been associated with cherished reminiscences through all generations. The history of the past would have presented very different aspects to those we are compelled to contemplate—Greece had not fallen before Macedon nor

Rome, and the colonies of Attica had probably been at this day as numerous and widely spread as those of any other people.

Had the idea once occurred to the more advanced of the ancients that inanimate forces are the paramount agents of national prosperity and strength—that only as they are developed can a people rise in civilization—that savages are such because they use no powers but their own—that semi-barbarians are indebted for what progress they make to the labor of animals, and the more advanced to currents of wind and water—and that when the more efficient but less obvious energies of the gases are employed, agriculture, commerce, manufactures, and all the great physical transactions of life can be carried on with a tithe of the expenditure of human muscle—the world would not now be struggling, as it is, with ignorance and misrule.

If any should still be found to object to the organization of the proposed institution, they might be reminded that it would add a link—a bright and not a weak one—to the chain of national brotherhood.

PREMIUM MEDALS.

Another wise custom of old—wise because founded on a knowledge of the human heart, and of the springs of human action—was to strike medals in honor of remarkable men; hence the names and features of classical conquerors, statesmen, orators, historians, philosophers, and poets, that have come down. Similar compliments to professional eminence, good or bad, have been conferred by all modern nations. Let it be our part to present characteristic medallions to those whose labors tend not to depress and destroy, but to bless and exalt the race.

In Europe those that excel in the fine arts are complimented with casts and medals of Raphael, Rubens, Canova, &c., and with us, kindred ones for similar purposes have been struck, bearing the portraits of Stewart, Allston, and others. Why not adopt the same plan for the promotion of the Industrial and Productive Arts? I respectfully propose that three sets of dies be prepared for producing, in bronze or other metals, MEDALLIONS of FRANKLIN, FULTON, and WHITNEY, to serve as prizes and accompaniments of prizes, for valuable contributions to mechanical science.

Two, three, or more profiles might, if deemed proper, be impressed on each medal: thus Whittemore might be associated with Whitney, and Fitch and Oliver Evans with Fulton. Godfrey might be added to Franklin; and were it deemed proper to introduce profiles of the living, one still more appropriate might be named.

A series of medallions of eminent American inventors or mechanics, thus commenced, would be continued, and eventually form a new chapter in medallurgy, as instructive and interesting as any of which that science can boast.

It may be a question with some, whether those who patent their inventions should be permitted to enter them for premiums. In the opinion of the undersigned, no restrictions of the kind should be imposed: the object sought to be accomplished is to hasten the advent of discoveries advantageous to the general good, not to limit benefits which their authors may legally and righteously derive from them.

PREMIUMS FOR WHAT OFFERED.

Instead of publishing a schedule of prizes and devices, it would perhaps be expedient to leave the field entirely open, so that any remarkable invention or contribution to the arts, of sufficient importance, might receive an appropriate acknowledgment. There can, however, be no impropriety in suggesting a few of the subjects to which the attention of inventors might with advantage be directed.

An invention by which land can be worked with equal facility *without animals* as with them, is one. In attempting the solution of this problem, it might be well if inventors would avoid copying too closely the action of the plough, and turn their attention to equivalent, though not analogous, processes for digging into, raising, turning, and breaking the soil: remembering also (what looks very like a *sine qua non* in locomotive ploughing) to bring the points of resistance rather under the power than in the rear of it, as in cattle-ploughing, or so far in advance of it as some projectors would have them.

If the thrusting action had not been so completely identified in idea with the plough, it had long ago been modified, at least for some kinds of earth. But the implement has become so sanctioned by time, is rendered so venerable by antiquity, and revered as the symbol of the first and last of arts, that reforming spirits have kept away from it, hesitating to propose any radical change in so universally cherished a favorite. The fact may be assumed that in its stereotpyped forms and features, the plough belongs exclusively to the cycle of animal motors. It cannot go beyond them without undergoing more or less of a metamorphose. When inorganic prime-movers take it in hand the rectilinear will most likely give place to a rotary and to a paring or semi-paring action.

There is no difficulty in combining the effect of the plough, harrow, and pulverizer, or clod-breaker, in the same machine, for soils the most tenacious. A single or a series of cutters or prongs at the ends of vertical revolving shafts (on the principle of oblong boring machines or such as are used for removing the blank surfaces of engraved blocks of wood) might be carried over a field with very little resistance to its progress, while each cutter, equivalent to a plough, would work away the most adhesive soil—paring it off in shavings of any determined thickness in front, and leaving them well broken and commingled behind:—cutting away roots in its path by piecemeal and opening the soil thoroughly for the air's percolation (a most essential part of an intelligent ploughman's treatment of his land) instead of successive rows of solid slabs, which the present implement, by its wedge-like operation, compresses and turns up.

By obvious devices, implements of this kind could readily be made adjustable to surface or to the deepest subsoil ploughing; while the power required, even in the latter operation, would hardly ever equal that consumed in ordinary applications of common ploughs.

The earth, hitherto tortured by ignorance and then denounced for barrenness, is about to receive better usage. A new epoch in agriculture is clearly at hand; brought near by the labors of chemists and inventors, to whom the glories of a conquest extending over the planet and replete with unalloyed blessings to the entire human race will belong. Husbandmen acquiring a knowledge of chemical and mechanical laws, will cease to violate them, and with a tithe of their present toil reap abundant and certain harvests; certain,

because blight, mildew, and every other disease incident to plants, will become eradicated and famine be unknown. It will not be long ere this and other terrible natural scourges will be acknowledged as the unavoidable penalties of neglecting to employ the powers given us to ascertain and remove the causes of them.

A premium of $10,000 for an economical LOCOMOTIVE PLOUGH, or even a higher sum, would, in a national view, be money well laid out.

If the device be not realized by steam, it will be an early corollary of the next motor.

INCREASING THE SPEED OF OCEAN STEAMERS

Is another desideratum. These vessels constitute a marked feature in modern navigation, but rapid as naval travelling has come to be by them, it will unquestionably be carried to a much higher standard. The first locomotives did not average five miles an hour. In 1825, a European writer placed the maximum velocity at six, and ridiculed the promulgation of "such nonsense, as that we shall see locomotive engines travelling at the rate of twelve, sixteen, eighteen and twenty miles an hour." In 1829, fifteen miles was atained—soon after, that speed was on one occasion nearly doubled. Within the last seven years, twenty miles was deemed the highest consistent with safety; subsequently, thirty was reached—then thirty-five was supposed to be the extreme limit, but recently, a mile a minute has been attained, and is kept up in some English express trains. Even seventy miles an hour has been reached. The average speed of railroad travelling will certainly come up to sixty. So with oceanic locomotors:—they have been gradually growing faster; and, admitting in their case, to a greater extent than air opposes to locomotives, an increased resistance with increased speed, there is no reason to suppose anything like the limits has been attained. They have run up from four, to six, eight, ten, twelve, to about fifteen, their present average, and must continue to run up.

I propose, that a premium of $20,000 be offered for improvements by which a vessel shall make three consecutive trips across the Atlantic, at an average speed of twenty miles an hour; and another of $20,000, for those by which twenty-five miles shall be done. Such premiums will tend to put the enterprise and ingenuity of our citizens still more on the stretch, and urge them to shoot ahead of the present craft, either by decided improvements in propelling apparatus or by the introduction of new principles of propulsion.

PRIZE FOR A NEW MOTOR.

Steam, the only force artificially evolved, it is admitted, has surpassed the brightest foreshadowings. The heart of modern society, it has quickened and animates the most distant members. In political and moral renovations, its pulsations are not less perceptible than in scientific and mechanical.

But steam is ordained to be superseded to some extent by, or at least associated with, other prime movers. To stimulate the inventive genius of our countrymen, and endeavor to secure to the republic the imperishable honor of giving a new mechanical power to the world, it is respectfully proposed to Congress to authorize the offer of a premium of ONE HUNDRED THOUSAND DOLLARS, to be drawn from the treasury or from future accumulations of the Patent Fund, to him who within the next—— years shall render *Electricity* in any of its forms an economical, efficient, and general prime mover:

Or who, within the same period, shall discover and make known the means by which *atmospheric pressure* can be profitably employed in the propulsion of sea-going vessels, and land-locomotives, or as a general impeller of fixed machinery; by some rapid mode of expelling air from a cylinder or of annihilating it under a piston:

Or, who develops an *explosive*, or other prime mover, applicable, energetic, and economical, as the vapor of water, and whose exciting and transmitting mechanism is less massive and costly than that of the steam engine.

[It is cargoes of fuel, tanks of water, and huge boiling caldrons, with their heavy and dangerous adjuncts, in steamers and locomotives, that are wanted to be got rid of.]

Were the amount offered a million of dollars, it would be none too much; and were it drawn from the public coffers, no very strong objection could be brought against it, since the community would be benefited by the stipulated consideration a thousand fold.

It is not probable that this premium would be claimed under several years, so that no inconvenience from an early withdrawal from the Patent Fund, if from that source Congress determine to offer it, of so large a sum, need be anticipated; but were it to be awarded to-morrow, so much the better for us and our race.

VII.

HISTORICAL NOTICES OF INVENTORS AND PATENTEES.

Facts and incidents connected with the early history of steam engines and steamboats on this hemisphere, and such as relate to the development of other chief elements of civilization, are rich in interest, and will become more and more so as time rolls on. There is no doubt that many may be gleaned from private documents, old pamphlets and newspapers, but which, like memorabilia of the revolution, if not gathered soon, will be irrecoverably lost. Embracing notices of early inventors and the first patentees, it is deemed an appropriate duty of this office to collect and preserve them. I therefore propose to incorporate such as can be procured, in the annual reports, to which they will impart increased value, at least in the estimation of inventors, and yet add but a very few pages to each. An illustration of what is intended is furnished in the subjoined documents relating to

JOHN FITCH.

1. A description of his boat, elucidated by a cut, both communicated by him to the Columbian Magazine.
2. A pamphlet written by him entitled "The Original Steamboat," &c., from a copy in the library of Peter Force, Esq. With the postscript, it occupies thirty-four pages.

A Description and Figure of John Fitch's Steamboat, by himself.

To the Editor of the Columbian Magazine:

Philadelphia, December 8, 1786.

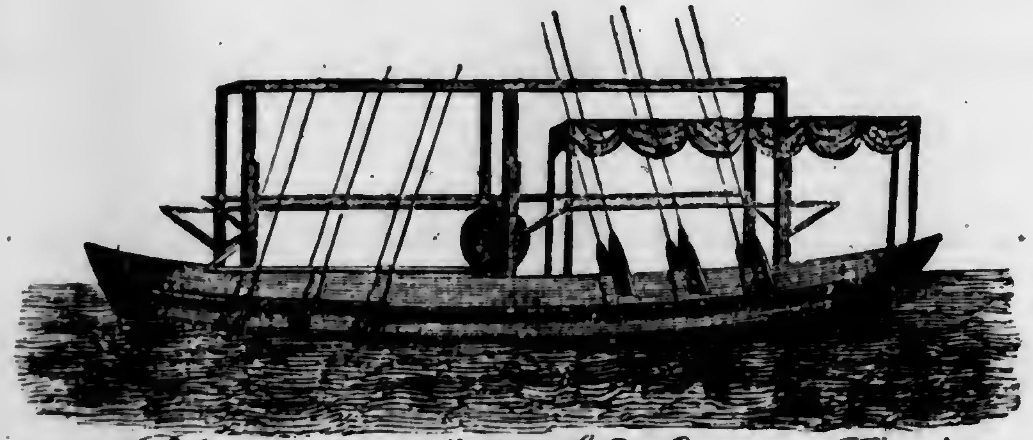
Sir: The reason of my so long deferring to give you a description of the steamboat has been in some measure owing to the complication of the works, and an apprehension that a number of drafts would be necessary in order to show the powers of the machine as clearly as you would wish. But as I have not been able to hand you herewith such drafts, I can only give you the general principles. It is, in several parts, similar to the late improved steam engines in Europe, though there are some alterations. Our cylinder is to be horizontal, and the steam to work with equal force at each end. The mode by which we obtain what I take the liberty of terming a vacuum, is, we believe, entirely new, as is also the method of letting the water into it and throwing it off against the atmosphere without any friction. It is expected that the engine, which is a twelve-inch cylinder, will move with a clear force of eleven or twelve hundred weight after the frictions are deducted; this force

is to act against a wheel of eighteen inches diameter. The piston is to move about three feet, and each vibration of the piston gives the axis about forty evolutions. Each evolution of the axis moves twelve oars or paddles, five and a half feet, which work perpendicularly, and are represented by the stroke of the paddle of a canoe. As six of the paddles are raised from the water, six more are entered, and the two sets of paddles make their strokes about eleven feet in each evolution. The cranks of the axis act upon the paddles about one-third of their length from the lever end, on which part of the oar the whole force of the axis is applied. Our engine is placed in the boat about one-third from the stern, and both the action and reaction turn the wheel the same way.

With the most perfect respect, sir, I beg leave to subscribe myself,

Your very humble servant,

JOHN FITCH.



Plan of Mr Fitch's Steam Boat.

THE

ORIGINAL STEAM-BOAT SUPPORTED;

OR

A REPLY

TO

MR. JAMES RUMSEY'S PAMPHLET:

SHEWING THE TRUE PRIORITY OF JOHN FITCH, AND THE FALSE DATINGS, &c. OF JAMES RUMSEY.

PHILADELPHIA:
PRINTED BY ZACHARIAH POULSON, JUN.,
ON THE WEST SIDE OF FOURTH STREET, BETWEEN MARKET AND ARCH STREETS.
MDCCLXXXVIII.

PREFACE.

AGREEABLY to a promise made in the Independent Gazetteer, I now present to the public a reply to the pamphlet published by Mr. Rumsey of Virginia,—and, as I have no matter to conceal, or disguise, and wish my readers to have a full and fair view of the whole controversy, I have re-printed and annexed Mr. Rumsey's pamphlet, which will discover to every impartial person who will take the trouble to examine the subject, that he hath no sort of just pretension to the claims he hath exhibited. His skill in the mechanism of a steam engine, may possibly be greater than mine, and in the article of condensation, I freely acknowledge he is my superior, having acquired the art of *condensing* (with the dash of his pen), one *whole year* into the compass of *six days*.

Philadelphia, 10th May, 1788. JOHN FITCH.

THE ORIGINAL STEAMBOAT SUPPORTED, &c.

IT is the duty of every man not only to avoid the commission of a crime, but so to conduct himself through life as to bear the strictest scrutiny.

In a pamphlet published by Mr. James Rumsey and lately circulated in this city, as well as probably in other states, I am charged as the perpetrator of crimes attrocious in their nature, but of which my conscience fully acquits me. It is an exercise of malevolence in the extreme, thus publicly to prefer charges against an innocent person without previously knowing or inquiring for the defence of the supposed offender, and shows an inability in the accuser to support his charges. Unfortunately for Mr. Rumsey, I trust we are now before an impartial public, where justice unbiased by party or undue influence, will decide between us. Conscious of my conduct, in the prosecution of this business, being that of an honest man, it is incumbent on me to recite the circumstances, and facts relative thereto.

I confess the thought of a steamboat, which first struck me by mere accident about the middle of April, 1785,* has hitherto been very unfortunate to me; the perplexities and embarrassments through which it has caused me to wade, far exceed anything that the common course of life ever presented to my view. After pondering some days on the thought, I made a rough draught, but not daring to trust my own opinion too far, I consulted Mr. Daniel Longstreth, the Rev. Nathaniel Irwin, and sundry other gentlemen of Bucks county, Pennsylvania.

About the beginning of June, 1785, I went to Philadelphia, and shewed it to Dr. Ewing, Mr. Patterson, and other respectable characters in the city, from whom I met with no discouragement. In June and July I formed models, and in August laid them before Congress, as will appear on their files. In September I presented them to the Philosophical Society, as per certificate.

No. 3.

PHILADELPHIA, 1785.

September 27th, 1785.—At a special meeting of the American Philosophical Society, a model accompanied with a drawing, and description of a machine for working a boat, against the stream, by means of a steam engine, was laid before the society by John Fitch.

At a meeting of the American Philosophical Society, on December 2nd, 1785.—A copy of the drawing and description of a machine for working a boat against the current, which some time ago, was laid before the society by Mr. John Fitch, he this evening *presented* to them.

Extract from the minutes,

SAMUEL MAGAW,
One of the Secretaries.

In October I called on the ingenious Mr. Henry of Lancaster, to take his opinion of my drafts, who informed me, that I was not the first person who had thought of applying steam to vessels; that he had conversed with Mr. Andrew Ellicott, as early as the year 1775, and that Mr. Paine, author of Common Sense, had suggested the same thing to him in the winter of 1778; that some time after, he (Mr. Henry) thinking more seriously of the matter, was of opinion it might be easily perfected, and accordingly made some drafts, which he proposed to lay before

* Vide No. 1 and 2.

the Philosophical Society, and which he then shewed me, but added, as he had neglected to bring them to public view, and as I had first published the plan to the world, he would lay no claim to the invention. The following I have been favored with from Mr. Ellicott.

No. 4.

BALTIMORE, April 26th, 1787.

I do hereby certify, that early in the year one thousand seven hundred and seventy-five, Mr. William Henry, of Lancaster, conversed with me on the subject of *steam*, and intimated that he thought it might be advantageously applied to the navigation of boats.

(Signed) ANDREW ELLICOTT.*

From Lancaster I went to the Assembly of Virginia, first waiting on Governor Johnson, of Maryland, who notwithstanding the letters he has since written in favor of Mr. Rumsey, acknowledged a merit in my invention, and that it ought to be encouraged, as will presently appear. During my journey through Maryland, in October, I passed through Frederick Town, and every where published my plan. In Virginia, I waited on his Excellency General Washington, who, in the course of conversation, informed me that the thought of applying steam was not original, that Mr. Rumsey had mentioned steam to him; but nothing that passed in the conversation with General Washington had the least tendency to convey the idea of Mr. Rumsey's relying on steam, and General Washington's letter, page 10, in Mr. Rumsey's pamphlet, clears up the matter—for the General himself did not conceive any such thing. Knowing that the thought of applying steam to boats, had been suggested by other gentlemen *long before*, I left his Excellency General Washington with all the elated prospects that an aspiring projector could entertain, not doubting but I should reap the full benefit of the project; for although I found that *some* had *conceived* the thought before, yet I was the first that ever exhibited a plan to the public; and was fully convinced that I could not interfere with Mr. Rumsey, otherwise the known candor of General Washington, must have pointed out to me such interference. I immediately applied to the Legislature of Virginia, for assistance, to execute my plan, who signified their wish to encourage my designs, but that the state of their finances prevented it. The then Governor of the state Patrick Henry, Esq., received from me an obligation with provision, that if I procured in that state, a sale for one thousand of my maps of the N. W. part of the United States, at 6s. 8d. each, I should exhibit a steamboat on the waters of Virginia, within nine months, or forfeit and pay to the State of Virginia £350, as appears by the following certificate:

No. 6.

I certify, that John Fitch has left in my hands a bond, payable to the Governor for the time being, for £350, conditioned for exhibiting his steamboat, when he receives subscriptions for 1000 of his maps, 6s. 8d. each.

November 16th, 1785.

(Signed) P. HENRY.

I then returned to Maryland and acquainted Governor Johnson of my expected assistance in Virginia, and that I intended applying to the Assembly of Maryland, then sitting, to promote and patronise my scheme. Governor Johnson gave me the following letter to General Smallwood, the then Governor of the State:

No. 7.

FREDERICKTOWN, November 25, 1785.

SIR: Mr. John Fitch, of Bucks county, in Pennsylvania, called on me in his way to Richmond; he has gone through a variety of scenes in the back country, which has enabled him to collect a knowledge of a great part of the new States, on which and other helps he has made a map useful and entertaining. His ingenuity in this way strongly recommends him. But his genius is not confined to this alone; he has spent much thought on an improvement of the steam engine, by which to gain a first power, applicable to a variety of uses, amongst others, to force vessels forward in any kind of water. If this engine can be simplified, constructed, and made to work at a small expense, there is no doubt but it will be very useful in most great works, and amongst them, in ship building. Mr. Fitch wants to raise money to make an experiment on boats. The countenance that he has met with in Virginia, he hopes, will enable him to do it. He wishes, also, to make other experiments, and is willing to enter into engagements to apply a large proportion of the sales of his maps, his principal fund. I believe his passion for this improvement will be ample security for his applying the money in that way. All that I have to request of you, sir, is, that you will give him an opportunity to converse with you. You will soon perceive he is a man of real genius and modesty; your countenancing him will follow of course.

I am, sir, your excellency's most obedient and most humble servant,

(Subscribed) THOS. JOHNSON.

His excellency Governor SMALLWOOD.
Favor of Mr. FITCH.

* Vide Mr. Henry's certificate, No. 5.

From hence it plainly appears that Governor Johnson could not, at that time, have any idea of my scheme interfering with Mr. Rumsey's, as seems to be now insinuated in that gentleman's letter to Mr. Rumsey, No. 14 of his pamphlet.

I attended the session of the legislature about three weeks after receiving this letter, and on my petition for assistance to execute my plan, they made me the following report, or nearly in these words, as may appear by examining their minutes: "However desirous it is for liberal and enlightened legislatures to encourage useful arts, yet the state and condition of our finances are such that there can be no advance of public money at present." From this report it is proved beyond all doubt that the Assembly of Maryland did not conceive my plan the same as Mr. Rumsey's. Finding that I was undoubtedly the first person in America that could be termed the inventor of a steamboat, either agreeably to custom or equity, I thought it prudent to apply to the different States for the exclusive privileges for the emoluments of such invention, which were granted by New Jersey in March, 1786, by Delaware, New York, and Pennsylvania in the winter and spring following, and by Virginia in October, 1787.

I have, from the time of my first thought, pursued my scheme with unremitted application, without a suspicion of an interruption, until the circulation of Mr. Rumsey's invidious pamphlets, the contents of which I now find it necessary next to take under consideration, not doubting but that the design and tendency of that production will be a sufficient apology for the plainness with which I shall treat it.

Mr. Rumsey says, in page 2, that "in the month of September, 1784, he exhibited the model of a boat to his excellency General Washington, at Bath, in Berkeley county, calculated for stemming the current of *rapid rivers only*, constructed on principles very different from (his) present one. Satisfied of the experiment of her making way against a rapid stream by *the force of the stream*, the General was pleased to give me a most ample certificate of her efficacy." Here it is to be observed that no mention was made to General Washington of *steam*, at the time of such exhibition; the principles upon which the boat was propelled were entirely unconnected with, and distinct from, steam, being simply a model propelled by water wheels, cranks, and setting poles—a mode which was many years ago tried on the river Schuylkill by a farmer near Reading, but without success. From an exhibition of this plan it was that Mr. Rumsey procured the certificate from General Washington, and on that certificate were Mr. Rumsey's laws founded. In his petitions to the several legislatures he prayed for no exclusive right for the use of steamboats, neither did he make mention of steam to their committees, or even suggest an idea of the kind: as proof of which I offer the following petition to the Assembly of Pennsylvania, the certificate from General Washington accompanying it, and the certificate of Manuel Eyre, esquire, who was one of the committee of Assembly who reported in Mr. Rumsey's favor.

No. 8.

I have seen the model of Mr. Rumsey's boats, constructed to work against streams, examined the powers upon which it acts, been eye-witness to an actual experiment, in running water of some rapidity, and give it as my opinion (although I had little faith before) that he has discovered the art of working boats by mechanism and small manual assistance against rapid currents; that the discovery is of vast importance, may be of the greatest usefulness in our inland navigation, and if it succeeds, of which I have no doubt, that the value of it is greatly enhanced by the simplicity of the works, which, when seen and explained, may be executed by the most common mechanic.

Given under my hand at the town of Bath, county of Berkeley, in the State of Virginia, this 7th of September, 1784.

GEORGE WASHINGTON

No. 9.

To the honorable, the Representatives of the State of Pennsylvania, in General Assembly met:

GENTLEMEN: Whereas your petitioner has formed a plan for facilitating the navigation of rapid rivers, he therefore doth propose to construct a certain species of boats of the burden of ten tons, which shall sail or be propelled by the combined influence of certain mechanical powers thereto applied, the distance of between twenty-five and forty miles per day, against the current of a rapid river, notwithstanding the velocity of the water should move at the rate of five miles per hour and upwards, with the burthen of ten tons on board, to be wrought at no greater expense than that of three hands. And as a premium of so useful an invention, your petitioner prays for an act to pass this honorable house granting to your petitioner, his heirs and assigns, the sole and exclusive right of constructing, navigating, and employing boats constructed upon his new invented model, upon each and every creek, river, bay, inlet, and harbor within the limits and jurisdiction of this commonwealth, for and during the term of ten years, fully to be completed and ended, to be computed from the first day of January next: provided always, that the legislature of this commonwealth may, at any time within the term aforesaid, abolish the exclusive right herein prayed for, by the payment of ——— pounds in gold or silver. And your petitioner, as in duty bound, shall pray.

JAMES RUMSEY.

The foregoing is a true copy of the original petition remaining on the files of the General Assembly, and read in the house November 26th, 1784.

J. SHALLUS, *Ast. Clk.*

No. 10.

PHILADELPHIA, the 6th May, 1788.

This may certify that I, the subscriber, was in Assembly for the year 1784, and was appointed one of the committee to report on Mr. James Rumsey's petition for his boat to go against the streams of rapid rivers, and that there was no mention nor any idea held up to the committee that it was to be propelled by the force of steam.

(Signed,) MANUEL EYRE.

Now I ask, whether it does not amount to a positive proof that Mr. Rumsey had no sort of reference to or dependence on steam? General Washington says: "It is so *simple* that it may be executed by the most *common mechanic;*" which certainly his excellency would not have said of a steam engine—a machine that has cost me two years to understand and complete. If we examine the petition, we shall find that it confirms the General's idea of simplicity; for Mr. Rumsey says, "It may be wrought at no *greater expense* than that of *three* hands;" plainly indicating that the *expense of fire* was not in contemplation. And to put the matter out of all doubt, Mr. Eyre declares, "*There was no idea* held up to the committee that it was to be propelled by *steam.*"

All Mr. Rumsey's laws were obtained, in consequence of his model, shown to General Washington at Bath, which, as I have said, was nothing but water wheels, cranks and setting poles; therefore he could have no pretension to the use of steam, under those laws. With the same propriety his claim might extend to every power and every machine in the United States, as soon as any man had invented one that would suit his purpose; so that, upon his plan of law making, no other man would be safe in expending his money, but all must be swallowed up by his pretendedly ambiguous laws. But I am happy in knowing, that *his laws* as well as *his claims* cannot interfere with *mine;* for, had he professed any reliance on steam, or any intention to apply it to his boats, he certainly would not have neglected inserting so important a part of the scheme in his petitions to the different legislatures—nor would he have prayed to be invested with the exclusive privilege to use boats constructed on such different principles from those he really intended to pursue. In Mr. Rumsey's act passed in Pennsylvania, it is styled, "The exclusive right of constructing, navigating, and employing boats built and to be built on his new invented mode." And this new invented mode, viz: cranks, water wheels and setting poles, is all he was entitled to under that law. Can it be supposed that the legislatures would not have included steam in their laws if they had been informed by Mr. Rumsey that it was his grand dependence, the essential, the vital part of his scheme, as he now professes. That they had no such intimation given them is very evident from their encouragement to me; and the laws since passed are the fullest proofs of the received meaning of Mr. Rumsey's petitions, viz: that they had no connection with steam. And that Mr. Rumsey did not think himself misunderstood must certainly be granted, because he made no objection to any of my petitions, as interfering with his laws, which, agreeable to his own declarations, were founded on principles very different from a steamboat. That he had no claim to steam under his laws is evident, from his confession in page 4, line 31, where he says, "I find my idea of steam was *nearly matured* before steam had ever entered his head, by his confession to Governor Johnson, viz: April, 1785." Now can it be supposed Mr. Rumsey had made considerable *improvements* on steam engines in 1784, or that he had obtained laws securing a right to the use of steam to boats, when, at the time of his petitioning for, and the passing of those laws, he confesses his idea of steam was not *matured.*

He says, in page 3, line 1, "In the course of that fall and winter, (of 1784,) he made progress in some steam engines"—and page 16, line 7, of Governor Johnson's letter, "I think in October, 1785, you told me you relied on steam for your first power, and wished me to promote your having some cylinders cast at my brother's and my works—the attempt did not succeed." Speaking of General Washington, the Governor adds, "But the General seems to have thought it an *immatured idea that he did not imagine you then relied on;*" viz: in November, 1784. These two last acknowledgments on the part of Mr. Rumsey, must destroy the facts alleged in the first, viz: that "He made progress in steam engines in the fall and winter of 1784." For the information given to General Washington, in confidence, respecting the boat, was such that the General "did not think he then relied on steam;" which is fully confirmed by his making use of the General's certificate to the Assemblies, wherein the discovery is treated as being "enhanced by its simplicity, and may be executed by the most common mechanic"—which surely no person would say of a steam engine.

His application to Governor Johnson for castings for a steam engine, is insinuated to have been in October or November, 1785, which I must deny, and refer to the Governor's own letter for the proof; being confident that no such application had been made to that gentleman by Mr. Rumsey, *previous* to my obtaining the letter of recommendation to Governor Smallwood. But even had it been true, it goes no further back than October or November, 1785, which was the very time I was publishing my plan through Pennsylvania, Maryland and Virginia, and was near three months after the time I laid it before Congress. And yet this attempt to have a cylinder cast at Governor Johnson's works, in October or November, 1785, is the first essay towards bringing forward a steam engine that is offered in proof, admitting it to have been at the time Governor Johnson supposes, which I cannot allow, for reasons I shall presently offer in addition to what I have already said on this head. Then how are we to

reconcile the assertion of Mr. Rumsey's having made considerable progress in steam engines in the "fall or winter of 1784," when it appears his first attempt (by this account) was not made until after October or November, 1785, as mentioned by Governor Johnson's letter. I shall hereafter show, to a demonstration beyond all possibility of doubt, that this same engine, said to have been completely made in Fredericktown, in December, 1785, *was not begun* until March, 1786. On comparing Governor Johnson's letter, sent under my care to General Smallwood, dated November 25th, 1785, (a considerable time after I first explained to him my model, and acquainted him of my intentions of pursuing the scheme,) with his letter to Mr. Rumsey, dated December 18th, 1787, it must unavoidably call in question the *memory* or *candor* of the writer—the *latter* I most certainly ought to acquit, and should have been happy had I obtained the least *explanation* on this head, when I lately made a journey to his house, expressly to procure it. Possibly it may still be received. If Governor Johnson knew and believed the legal priority of Mr. Rumsey's claim to a steamboat, and was entrusted with his secret, how was it possible he could have encouraged a man "*of real genius and modesty*" (as he was pleased to term me) to proceed on an experiment, which, terminate as it would, must inevitably end in loss and disappointment. For, should the experiment fail, which was then thought very doubtful, the small fund which I should raise by the sale of my maps must likewise fail—for I was to expend it in Virginia, as appears by Governor Henry's certificate, page 5. Should the experiment succeed to the utmost of my wishes, I should suffer more severely, not in my money and time only, but in my reputation—and meet the treatment of a man trespassing on the rights of a fellow citizen, who had a law in his favor.

Had Governor Johnson, at the time he encouraged me, known the priority of claim to be fairly and justly in Mr. Rumsey—had he been *then* in possession of his secret—or had he believed any title vested in Mr. Rumsey to the exclusive use of steam, under the law of Maryland, so recently passed in his favor, the Governor certainly would not have requested a gentleman of General Smallwood's rank to countenance me—not only to trespass on the rights of Mr. Rumsey, but to violate a law which, as Governor of the State, he was bound to support. Another circumstance corroborates my assertion of misrelation of facts as to time.

It will be recollected that Governor Johnson's letter, recommending me so very minutely and warmly to the patronage of Governor Smallwood, was dated 25th November, 1785; and in his letter to Mr. Rumsey, the Governor says, "In October or November, 1785, you told me you relied on steam for your first power, and wished me to promote your having some castings at my brother's and my works—the attempt did not succeed. I considered myself under an obligation to secresy, 'till in the progress of making copper cylinders in Fredericktown, *some time after*, when I found that the designed purpose of the cylinder was a *subject of pretty general conversation.*" Now the Governor's letter in my favor was dated 25th November, 1785, and the whole machinery is sworn to have been completed on the 1st December following, only *six days* after the time of my getting this letter of recommendation—and as the cylinder was a subject of "pretty general conversation," I could not have been kept in ignorance by the Governor, from his "obligation to secresy," because it was no longer a secret at Fredericktown.

The thing was impossible in its nature, that the cylinders and copper works should have been making, and a subject of general conversation in Fredericktown on the 25th day of November, 1785, the time I was obtaining my letter of introduction to Governor Smallwood in that very town, and must have heard it myself, if Governor Johnson had been so disingenuous as to conceal it from me, which is absurd to suppose; for I made *my* business publicly known in that town; and, therefore, if Mr. Rumsey's cylinders were the subject of general conversation, I must have heard it from every quarter: therefore, it clearly follows that the conversation about casting of the cylinders, the obligation of secresy, and the general conversation about the design of the cylinders in Fredericktown, could not have happened in the year 1785. If Mr. Rumsey had made Governor Johnson his confidant "in October or November, 1785," it is highly improbable that he would so far have deceived Mr. Rumsey and me as to encourage my pursuit of a similar nature, within so short a time as six days of its being completed. And it is equally improbable that Mr. Rumsey should have communicated this secret, and requested his assistance in procuring castings *immediately after* my being with the Governor, as there was not time for it, the engine being sworn, as I have said, to have been completed *six days* after that visit. Then the following conclusion may be safely drawn, that Governor Johnson did at some *subsequent* day (so long after as that he forgot the letter he had given me) offer to assist Mr. Rumsey with castings, which not succeeding, an application was made to coppersmiths in Fredericktown, the ensuing spring, who, in the course of the summer 1786, delivered their work to Mr. Rumsey. About *this time* it was that the matter became a subject of "*general conversation;*" and if *winter* stopped the putting the whole machinery into motion, as sworn to by Messrs. Barns & Morrow, it was the *winter* of 1786, which is *long after* my boat was built, and my model of a steam engine completed. Of this my readers will soon be fully convinced. And a further weighty proof is, that as Mr. Rumsey professes his hurrying on his engine was on account of my setting up pretensions, it cannot be believed that he would suffer my petition to lay before the Assembly of Maryland, and be reported on in my favor, about the 20th December, 1785, *nineteen days* after he says his boat and engine were finished. Mr. Foy, the member from Fredericktown, must have told the tale, and laid in a claim for his countryman. But I repeat it again, that I was in that very Fredericktown, on my way to the Assembly, in the *fall* of 1785, every where publishing my scheme, and no engine was begun there during

that year, nor until March following, as will be fully shown. But before I come to my proofs I wish to confute him out of his writings.

Let me pursue his explanation still further, and ask what could be the use of *secresy* in this business, if Mr. Rumsey, as he alleges, was secured in the use of the invention by law? Could he expect any countenance from the public for a scheme wrapped up in secresy, and which is confessed by Governor Johnson to have remained so until after I had published *my plan*, both in Maryland and Virginia. Mr. Rumsey and his confidential friends might have died, and then no advantage could have arisen to the community; and until such advantage was publicly imparted, certainly nothing could be expected from the public.

In page 16 he inserts part of a letter from General Washington, in answer to his of the 10th March, 1785, "It gives me much pleasure to find by your letter that you are *not less sanguine* in your boat project than when I saw you at Richmond, and that you have made such *further discoveries* as will render them more extensively useful than was at first expected." But still it is plain that the General only alluded to the setting pole plan, for in his answer to Governor Johnson, (even after my petition was before the Assembly of Maryland,) he *still* thought that Mr. Rumsey had "no reliance on steam." The General's saying that he thought Mr. Rumsey's idea of steam was "*immature*" in November, 1784, (the time they were at Richmond,) is a proof that Mr Rumsey's "*being not less sanguine*" must have alluded to his *setting pole* scheme, because no man can be said to be *sanguine* in any thing of which he has but an "*immatured* idea; and "*further discoveries*" will not apply to steam, because *steam* could be no *new* discovery, and was mentioned to the General at Richmond: nor is any thing mentioned of steam in the General's letter, at least in the extract. It is reasonable to suppose, if steam had been the dependable discovery, it would have been treated on more largely, and have produced a more pointed answer. The truth is, Mr. Rumsey placed no dependence on steam until my plan came forward and his own had failed. Conscious of the weakness of his claim, and the futility of his arguments to support it, he found that something more was necessary than merely an "immatured idea;" therefore, to add weight to his plea, he endeavors to establish himself under the solemnity of oaths, and attempts to prove that the machinery for his steam engine was executed in Baltimore and Fredericktown, so as to be completed and put together on the *1st of December*, 1785. These solemn and positive declarations are contained in the depositions of Charles Morrow and Joseph Barns, (No. 11 and 12 of his pamphlet,) who are probably interested in the scheme. The reader will please to examine these depositions—they are produced to support facts, which he is conscious *ought* to have existed at the time they specify, otherwise his pretensions would consequently fail. These two witnesses testify to absolute facts, and yet affix different periods of time for one and the same transaction. Page 13, line 14, of Charles Morrow's deposition, he says, "About the first of December, 1785, it appears to the said Charles that the *whole* of the machinery was ready to be fixed to the boat, which came down to the falls of Shanandoah for experiment, but the ice then commencing prevented it for the winter." And line 28, of the same deposition, he says, "In the spring of 1786 the machinery was put on the boat and the first trial made, said Charles being on board." Page 15, line 11, of *Joseph Barns's* deposition, he says, "In December, 1785, it was *put on the boat* at Shanandoah falls." These different declarations, or different times affixed, at which the machinery was *put on the boat*, of themselves tend much to destroy the validity of their oaths; for the time the machinery was put on board must have been a fact so notorious that it could not admit of a mistake, in a mind properly impressed with the importance of an oath. In page 10 and 11, William Askew swears that Mr. Rumsey's machinery will not weigh more than eight hundred pounds, and that he is well convinced it may be made for £20. It is a well known fact that of Mr. Rumsey's machinery the greatest part must consist of copper or brass, such as cylinders, tubes, cocks and valves, together with curious wrought iron. Now eight hundred pounds (were it all made of *iron*) could not cost less than double the sum. As this evidence is not brought to prove any thing about Mr. Rumsey's *priority*, it is of no importance, and the absurdity it contains might have been spared. Whether *his* machine or *my* machine is best, is nothing to the purpose. I have been daily altering, and never watched *his* motions and blunders, as it is evident he did *mine*. He, it seems, made a secret of his doings, whilst mine were open to all the world.

It is proper I should not pass over this part of my work without acknowledging that I have been greatly indebted to the assistance of my ingenious friend, Mr. Henry Voight, of this city; who has uniformly, from my first undertaking to build a boat, afforded me valuable hints; and has united with me in perfecting my plans. To his inventive genius alone, I am indebted for the improvement in our mode of creating steam; a thought which struck him above two years ago, the drawing having been shown to several persons; for we *never made a secret* of any part of our works; but a fear of departing from old established plans, made me fearful of adopting it, until I had found by his invention of *creating steam*, that a *condenser* might be constructed on the same principles, (viz., a spiral pipe or worm) only by reversing the agent, for the best way of applying *fire* to evaporate *water into steam*, must also be the best way of applying *cold water* to condense *steam*, that is, the bringing the greatest quantity of fire into action upon the greatest surface of water—or the contrary; and we had an additional inducement to study this subject, because the common way of fixing boilers, required so great a load of brick work, that it overloaded our boat. Therefore, the first thought that must occur to every man, attempting to raise steam on board a boat, must be to acquire that method which would require the least weight. Since Mr. Rumsey has been in town, I have been told that he says I have got *his mode* of creating steam; whether that be the case or not (or whether he has *got mine*) I do not at present know. But as both Mr. Rumsey and Mr. Voight laid their drawings and plans before the Philosophical Society the same day, it will appear how far they are alike. And Mr. Voight made a prior entry of his plans, in the Prothonotary's office in this city. If there should happen to be any similarity between them, it would be nothing surprising; having the same load on both their minds, they both sought relief; and, as sick persons, lacking a doctor, chance might have led them to the same man; and I had an undoubted right to apply every medicine that suited the disorder—but I will proceed with the pamphlet:—

In page 17, Henry Bedinger says, that Mr. James Rumsey informed him in or before the month of March, 1784, that he intended to give trial to a steamboat, and he believes he mentioned such intention of Mr. Rumsey's in Kentucky, which seems to have been a breach of honor, as it must be supposed Mr. Rumsey gave it to him in confidence; for he treated his idea of steam as a *secret* to Governor Johnson, long after; thus on the disclosure of this friend, Mr. Rumsey builds a charge against me, as having filched his scheme in Kentucky; this, like his other charges, is founded in falsehood, for it is a well known fact, that I have not been in Kentucky since the year 1781. The depositions of George Rootes, No. 8, and Nicholas Orrick, No. 10, testifying to his having informed them, in the year 1784, of his *projecting* a steamboat is quite useless, for reasons already given. Messrs. Henry and Paine *projected* it before him; and if bare projection was sufficient to build a claim on, I have no doubt but there are people now in their graves, whose heirs might set up more early claims than either of us. If Mr. Rumsey was in 1784 projecting a boat to work by steam, with a view of carrying it into actual execution, why did he not apply for the use of steam in his laws? The reason is plain,—General Washington gives it for him; it was "an *immatured idea*, and on which he thought he *did not rely*." I must therefore contend that these depositions lose their weight, and the whole of his conduct proves to a demonstration, that he could not have been engaged in making steam engines at the time mentioned by those witnesses, with a view of applying them to his boat. In page 20, No. 18, he inserts a paragraph of a letter said to have been written by a Mr. Daniel Buckley, near Philadelphia, by which he fixes the time of his applying himself to the "perfecting his steam engine with much ardor." In part of said inserted extract, speaking of me, he styles me "*a Mr. Fitch, of Philadelphia*;" now this letter, if the facts it recites are true, must have been written *after* the 17th of April, 1786, and not in 1785, as insinuated by Mr. Rumsey, for I was not an inhabitant of Philadelphia till after that period; nor did I ever hear that Mr. Rumsey was employed in making a *steamboat*, until long after that time; consequently I could not have used any expressions about it until after April, 1786. This is a very important part of the prevarication, and carrying the air of great plausibility, I must beg my reader's close attention to it, as I shall prove it to be false. Page 3, he says, "I wrote to General Washington the 10th of March, 1785, that I intended applying both powers (meaning steam as one) to build a boat after the model of one he saw at Bath, &c., and as I could gain truth only by successive experiments, *incredible delays* were produced, &c. I bore the pelting of ignorance and ill-nature with all resignation, until I was informed some dark assassins had endeavored to wound the reputation of his Excellency, and the other gentlemen who saw my exhibition at Bath, for giving me a certificate. The reflections upon these worthy gentlemen gave me inexpressible uneasiness, and I should certainly have quitted my steam engines, *though in great forwardness*, and have produced *the boat for which I had obtained the certificate*, for their justification and my own, had not a Mr. Fitch come out at *this critical minute* with his steamboat; asserting that he was the first inventor of steam, and that I had gotten what small knowledge I had from him, &c." Now this embarrassment being confessedly subsequent to the letter to General Washington just mentioned, viz., 10th March, 1785, the letter asserted to have been written by Mr. Buckley, is incontrovertibly fixed between this date and the 1st of December following, the time sworn to for completing of the steam engine; therefore, as Mr. Rumsey quitted his setting pole scheme and "pursued the perfecting his steam engines with increased ardor (page 3,) on *the receipt of this letter*, it becomes of moment to ascertain its exact date; and I shall show that this letter, which set Messrs. Rumsey and Barns to work in such haste, and with such "increased ardor," was not written until near a year after the time it is pretended, and the copper works said to have been made in 1785, were not begun until 1786, so that this machinery, completed so briskly, and sworn to have been on board in December, 1785, has made a jump of just twelve months, in order to persuade the public into a belief that Mr. Rumsey's works were begun time enough to supplant mine. "At *that critical minute*," says he, "came out a Mr. Fitch, asserting I had got what small knowledge I had from him." At *what* critical minute, I ask?—Mr. Rumsey's third page will tell us. In March, 1785, he informed General Washington by letter, that he *intended* applying steam to boats; in December following, Messrs. Barns and Morrow swear the boat was ready; and his exhibiting this boat, he confesses, was hurried on by the intelligence received from Mr. Buckley; consequently this work and this "increased ardor" was *subsequent* to the date of the letter from Mr. Buckley. Then, if I can fix the time of Mr. Buckley's writing the letter, I shall establish a certain fixed period at which Mr. Rumsey acknowledges his works were not on board his boat; and I felicitate myself in being able to do it so incontestibly, as to prove from his own writings that he has given *false dates*, and assigned *false reasons* for his movements. He knew at the time of inserting that quibbling account, that it would not bear the light, and therefore did not dare to give *the date* of Mr. Buckley's letter, wrote at that "critical minute," for Mr. Buckley's letter would have shown that this "critical minute" was not in 1785, when they swear the steamboat was ready, but in the summer of 1786, full twelve

months after I had made my plans public, and was procuring patterns for my present cylinder, and had made a complete model of a steam engine, in brass and iron. I have been at the pains of walking 66 miles to Pequa and Lancaster to see Mr. Buckley, that I might obtain an additional proof (to the many others I shall produce) that Mr. Rumsey has transposed the order of time, and antedated facts. Mr. Buckley frankly told me all he knew of the matter, and fixed the time of writing his letter, *so circumstantially*, to have been in 1786 and not in 1785, that not a doubt can remain—and it will further appear from the certificate he has given me, that the coloring as to fact, as well as to date, has been grossly disingenuous, as will be seen on comparing his certificate, No. 18, with the following:

No. 11.

This may certify that the paragraph that Mr. James Rumsey has copied from my letter, which he applies to the injury of Mr. John Fitch's character, was *not told to me by Mr. Fitch*, but by other persons, who, for reasons, were convinced of his priority of invention. And as to the time of writing the letter, it was *when Mr. Samuel Briggs was making patterns* for Mr. Fitch's castings. As witness my hand this 12th day of May, 1788. DANIEL BUCKLEY.

On my return to Philadelphia I applied to Mr. Briggs in order to ascertain the *time of his making my patterns*, and he freely gave me the following certificate:

No. 12.

This may certify whom it may concern that in the *summer of* 1786, I performed some turning work for John Fitch, being patterns for castings for his steamboat, and before that time I made no work for the said John Fitch; that I am acquainted with Daniel Buckley, and saw him at my shop during that summer, and at sundry times since, and we have frequently conversed about James Rumsey, but the particulars of any conversation with him I do not recollect.

SAMUEL BRIGGS.

Affirmed the 15th May, 1788, that the foregoing is just and true, before

PLUNK'T FLEESON.

Thus, independent of all other proofs, have I brought a conclusive evidence out of Mr. Rumsey's own writings and from his own testimonies, that the steam machinery *sworn* to have been on board *in December*, 1785, could not have been ready until December, 1786. And here I might safely rest my defence, and very properly quote Mr. Rumsey's own words, (annexed to this certificate, No. 18,) viz: "Should he incline to *assert* hereafter, what credit he will deserve has been so clearly proved that *future impositions* may be avoided, and *those* who spread a slander they *do not believe* deserve the contempt of all honest men."

But I will proceed, and must not omit remarking that this third page of his work is very fatal to him. He says, "I should certainly have quitted my steam engines, (*engines only in idea*,) though in great forwardness, and have produced *the boat for which I had obtained the certificate*, &c., had not a Mr. Fitch come out at this critical minute with his steamboat," &c. And further adds, "Had I exhibited my *first boat*, it would have been construed into an acknowledgment of Mr. Fitch's assertion, by producing a boat with which steam had nothing to do. These considerations compelled me to pursue the perfecting my steam engines with increased ardor." Thus I have a proof from himself that the certificates from General Washington, &c., (which procured his laws in Virginia, Maryland and Pennsylvania,) *had no reference to steam*; consequently *my laws* for the exclusive use of steam applied to boats cannot interfere either with *his* laws, or his expectations at the time of asking for them. I applied to the several legislatures openly and unguardedly, without friends and without patrons, and from the pure merit of my pretensions, met with success, without a whisper being breathed that I was interfering with Mr. Rumsey. I am confident that he never conceived me to be a rival in navigating boats until he found his own plan hopeless and mine likely to succeed.

In his third page he says, "I wrote to General Washington 10th March, 1785, that I intended applying both powers to a boat built after the model of the one he saw at Bath; but the disadvantages before mentioned still remained, and, as I could gain truth only by successive experiments, *incredible delays* were produced, and though my distresses were greatly increased thereby," &c. It is truly amazing, that—though he had long before this letter been making progress in steam engines, and gaining truth by successive experiments and *incredible delays*, insomuch that, at the time of his proposing to get cylinders cast at Governor Johnson's works, in October, 1785, he had the principal part of his work untouched—I say it is amazing that these *incredible delays* should all vanish as in an instant, and that, between the time of his failing at Governor Johnson's works, in October or November, 1785, and the first of December following, he should have completed his whole machinery, ready to be put on board. A steam engine is a complex piece of work, and his subsequent transactions show that he found it so; for it has taken him from the summer of 1786 (when he removed his works from Fredericktown) to the winter of 1787 to make them ready for a fair experiment. No person, therefore, can be brought to believe that his first machinery could have been conjured together in little more than thirty days. No such thing happened. I have already sufficient proof to the contrary, and have no doubt but a multitude of corroborating witnesses will voluntarily offer themselves when this pamphlet gets down to Fredericktown and Shepherdstown, where I shall take some pains to have it circulated. It

is truth alone I am in search of, in order to wipe off the imputations from my own character; for as to stability of title to my exclusive rights, I shall not cast away an anxious thought about it. I am secured by my laws, and my "*coadjutors*," as Mr. Rumsey is pleased to term them, I am sure, have no sort of apprehension about the moneys they have risked, and only wish that I should remove any aspersions that may be unjustly cast upon me. Thus far, it may be said, they have an interest in my success, because a law in my favor in Maryland is yet depending.

I must not yet quit the subject of Mr. Buckley's letter, in his third page, from whence it is plainly to be gathered that, subsequent to his letter of 10th March, 1785, to General Washington, he meant to tell the world he was busily employed in *private experiments* on steam engines, and that although his first setting pole boat "bore the pelting of ignorance and ill nature," yet he did not set about making a steam engine for this boat until (as he calls it) the *critical moment* when a Mr. Fitch, with his steam engine, came out, asserting that he was the first inventor of steam, and that "I had gotten what small knowledge I had from him." Now as all his experiments were privately conducted, and he does not pretend to have begun his boat engine until Mr. Buckley had sent notice that I charged him with stealing knowledge from me, I would ask any man where I was to obtain the grounds for my charge? It could not be until I had begun my own engine, and made it everywhere public. Then it follows that my pretended complaint against him must have been subsequent to my own works and prior to the beginning of his works for his boat in *November*, (as he calls it) which, from his own statement, has laid a fair and just foundation for my claim of public priority, for private priority is out of the question, as Mr. Henry, Mr. Ellicott, and Mr. Paine are before us both.

Nay, even after the real steam engine for his boat was actually begun, we find it kept as the most profound secret; and from Charles Morrow's deposition it is declared, that the boat came to Shepherdstown early in the fall 1785; that Mr. Barns went to Baltimore shortly after, to have some machinery cast; and on his return from Baltimore was sent to Fredericktown in order to have some other things made (which could not consistently with Governor Johnson's letter, be earlier than the beginning of November) and about the middle of November they were all finished, viz: *a boiler, two cylinders, pumps, pipes, &c.* I confess this is very brisk work for a country town—more than ever I could get in the city of Philadelphia.

At Baltimore four large cocks were bespoke by Mr. Barns, and the brass-founder was told they were for the *Warm Springs of Virginia* as will presently appear: Governor Johnson was entrusted with the scheme in confidence, and the copper works were carried on in Fredricktown with great secresy, insomuch that a citizen hearing it rumored that they were for a steam engine, applied to see them, but was refused, (as will be shown,) and the matter still remained a secret, until as Governor Johnson says, "the designed purpose of the cylinder, was a subject of pretty general conversation in Fredericktown." Then during this interval of privacy, surely any man that should have conceived the same idea, and brought it forward to public view, ought to be entitled to the right and advantages of the discovery—for all these confidential persons, as I have already said, might have died, and the world have lost the benefit. Let me consider the danger of admitting this new doctrine of claims: A man makes a valuable discovery, he pursues it at a great expense and publishes it to the world; a set of men combining together, shall afterwards come forth, swear for each other, that they had been making the same kind of engine, many months before, and bring proofs from respectable characters, that they had hinted at the practicability of such a scheme, even before their private experiments. Will any man of the least particle of understanding allow, that this *private work* shall be admitted to contain sufficient evidence to overset the public works of a fair and open artist? Surely not. If it was once allowed, men would not be wanting to swear away from the real inventor, the most valuable discoveries in the world. All they would desire from the public claimant, would be, for him to fix the earliest date to his discovery, and if it was twenty, or even fifty years back, they would prove that they themselves, their fathers or grand fathers, or some distant friend, had communicated it many years before. There is no end to this kind of proof; and both reason and law unite in defending the *first public* discoverer. It would be dangerous in the highest degree to deviate from this rule. If Mr. Rumsey did really in good faith and conscience intend to carry into execution, the secret he communicated to General Washington, I can only say he was unlucky in delaying it so long, as to let me, with my subsequent discoveries, come forward before him; what I did was public—it was notorious to all Virginia and Maryland, and not a murmur was raised against me, not a syllable uttered (that I ever heard) charging me with interfering with Mr. Rumsey. The Assemblies of Virginia and Maryland encouraged my scheme, and nobody told me I should interfere with him. My petitions laid long before the Assembly of Virginia, and a law was ultimately passed in my favor, without objection or complaint. Mr. Rumsey has insinuated that I got my first thought from Captain Bedinger in Kentucky, who went there in 1784; nay, he goes so far *in one place*, as to say, he "was told so," and in *another* that "circumstances leave little room to doubt it." I have already declared, that I have not been in Kentucky since the year 1781: thus falls to the ground, this part of his "plagiarism" allegations. But I will suggest to him, that it is much more probable that all *his* determinations of beginning his steam engine, might have come to him in a much straighter line, than from Kentucky to me. Captain Bedinger is so uncertain about the matter of his ever having mentioned *steam* in Kentucky, that he only says coldly, that he "*believes*" he also mentioned "that it worked by steam." I will remind Mr. Rumsey, that I not only *believe* that I presented my plan to Congress, *before* the time he pretends to have spoken to Gover-

nor Johnson about getting cylinders for him, and *before* his copper works were bespoke, but the files of Congress will *prove*, that in August, 1785, I laid my plan before them; and nobody will suppose it was a very indirect road from Congress to each of the United States. A very few days after my plan was laid before them, Mr. Rumsey might have been furnished with a copy of it; and if any member of Congress should know of such a transaction (certainly very innocent in itself) he will confer a great obligation on me by communicating it. But in Philadelphia it was public before it went to Congress, and long before Mr. Rumsey's orders went to Fredericktown or Baltimore. I have a fair right to suppose all these things, and Mr. Rumsey's giving me no opposition in my application for exclusive laws, and even permitting his law to expire in Pennsylvania, without trying to derive any benefit from it, amount to positive proof that he had no serious thoughts about applying steam, until it was too late. I promise him, I shall not be so dilatory in exhibiting *my boats* in Virginia, conformably to my law. I trust to the goodness of my cause and the honor and generosity of my country,—and that I not only have a substantial right by exclusive laws, but by justice and equity.

The affidavits from William Askew, No. 6, and Henry Bedinger, No. 7, to prove that Mr Rumsey's boat is much superior to mine, is acknowledging on the part of Mr. Rumsey, that his pretensions to the invention are but weakly founded. However faulty my works might be, and however perfect his own, it would have no force in the determination of our title to the invention; but argues a wish in him to gain an advantage on principles different from those on which our dispute must be ultimately *decided* in the *opinion* of the world. But even this position of Mr. Rumsey's I will not allow; for on a comparison of the velocity and bulk of both boats, and the force applied, it is evident that mine exceeded in the proportion of more than two to one. I had a bulk of water to remove equal to above twelve tons, whilst he had to contend with no more than three tons, if I am rightly informed; and our cylinders (or moving powers) were nearly, if not quite equal; yet my boat was urged forward with nearly the same velocity of his boat; therefore, his mode hath hitherto no superiority. As to his drawing water in at the bottom, and pushing it out at the stern of a vessel, it is no new invention, but was long before presented to the Philosophical Society at Philadelphia. The thought came originally from France, of which I was acquainted before he bespoke any of his works for steam, and contended the right of using it with Mr. Arthur Donaldson, in the beginning of 1786, before the Assembly of Pennsylvania, as he attempted at that time, to assume the discovery to himself.

No. 13.

I well remember when Mr. Arthur Donaldson proposed before the Committee of Assembly, a method of navigating boats by a stream of water forced through by means of a steam engine, that you appeared to be acquainted with the principle, which was said to be originally Dr. Franklin's, and that you then declared it had been your intention to have made an experiment upon it.

GEO. CLYMER

Mr. John Fitch, May 17, 1788.

In spite of all opposition I was left in full possession of that or any other way I chose, provided I worked by steam, and no man can take it from me until my laws expire. I conceive we have by no means come to the greatest perfection of applying our power. I am now trying an experiment, and the machine is nearly finished, to propel a boat, not by expelling *water*, but *air*, and hope Mr. Rumsey will allow that this is a mode peculiar to myself; but if he pleases, he will deny it, and assert that he had privately tried some experiments to ascertain its practicability. I further hope that the public will make great allowances for my not being more forward in my plans, especially when they consider the great difficulty of procuring proper workmen, together with the new and unexplored ground that I had to travel over, but hope shortly that I shall have it so perfect as to give full satisfaction of its utility.

In page 5, he asserts that my boat will not be propelled at the rate of more than three miles per hour, when no tide opposes; this assertion, I believe, will shortly be proved both rash and envious. I can make her go not only three, but three times three.

But as I have before mentioned, this is taking up the dispute upon different principles than those Mr. Rumsey found necessary to hold up to public view, viz:—that he was the inventor of the steamboat. This leads me to consider the principles on which exclusive privileges are founded, agreeably to justice and policy. If we have recourse to the enlightened nations of Europe, and more especially to England, whose laws respecting the title to property, are (with little, and in some cases, with no variation) in force among us, we shall find that their laws imply that no species of property ought to be held more sacred than the property of inventions; for having their origin in the imagination of man, uncertain in their operations, and expensively perplexing in experiment, it becomes necessary to have some mode established to secure to the owner the full benefit of his invention, which might otherwise prove his ruin. To prevent which, justice and good policy have pointed out a remedy, and custom has established it on a permanent basis. The inventor can claim no benefit from his thoughts or inventions, before he makes a public declaration of such invention in some place of record established for such purposes; that is—he who invented and published a *steam engine* will have an exclusive right for a certain number of years for all steam engines; at the *expiration* of which, each *improver* has an undoubted right to the benefit of any *improvement*. On these principles, he who first invented and published the idea of a steamboat, invests himself with a fair and just title to all steamboats for a certain time, which in justice and policy, government is bound to support. The State of Pennsylvania hath given her sentiments on this head, and hath declared such to have been her explanation of the title to inventions by rejecting Mr. Arthur Donaldson's petition to have me confined to a certain mode of applying my power. It was not the mode of *using the force of steam* which had any merit in this invention, but it was the idea of connecting *steam* with *navigation*, that justly claimed the public patronage, as soon as that idea was made public, and the benefit of it applied for.

I shall now introduce the proofs I have promised, and show to the world what degree of credit and countenance ought to be given to a man who, in order to deprive me of my just rights, has brought forward evidences to swear to facts which are totally false. You will see that transactions are antedated, and a deception intended, with a view both of disgracing and robbing me. Confident that gross misrepresentations had been made use of, I was at the expense and trouble of two journeys to Fredericktown, in Maryland, the scene of his operations, and there I was soon confirmed in my suspicions that this plausible pamphlet was built on falsehood, and that the patrons whom Mr. Rumsey's address has procured him in this city, have committed themselves too unreservedly to a stranger. I now find the reason of his so long delaying to put in his claim—it was that a period might elapse sufficient for memory to be uncertain, and for facts to be transposed in the order of time; the death of one of his principal workmen also rendered it probable that some of his pretended proofs might be difficult to detect. A love of justice has induced a number of persons to step forward and testify in the most unequivocal manner that the works sworn by Mr. Rumsey's evidences to have been finished the 1st December, 1785, were not begun until March following, when he must have been very fully possessed of a knowledge of my pretensions.

The ten following certificates will prove fully the antedating:

No. 14.

The affidavit of Frederick Tombough, Smith and partner of Mr. Zimmers, the copper-smith in Fredericktown, who made the copper work for Mr. Rumsey's steamboat.

Maryland, Frederick County, April 18th, 1788

Then appeared before the subscriber, a justice for said state and county, Frederick Tombough, aged about thirty-nine years, who being sworn on the holy Evangelists of Almighty God, deposeth and sayeth, that some time in March, 1786, he, this deponent, was in partnership with Matthias Zimmers now deceased, in a black-smith's shop adjoining said Zimmers' coppersmith shop, and that he remembers two copper pipes being brought into his shop by said Zimmers, to fix the seams—which pipes, he was told, were for Mr. Rumsey's steamboat—and further, that he knew of no work being done in Mr. Zimmers' shop on account of said boat, previous to the time above mentioned.

Sworn before

GEORGE SCOTT

No. 15.

The certificate of Mrs. Zimmers, widow of Mr. Zimmers, which is corroborated, and the time established by the next certificate:

This may certify that I, the subscriber, wife to the late Matthias Zimmers, deceased, have no accounts in my books so as to ascertain the time of Mr. Rumsey's bespeaking his machinery for his steamboat, or as to the time of his taking it away—but that Michael Baltzel turned works to finish the first machinery said Rumsey had of my husband, according to the best of my knowledge. As witness my hand, this 29th April, 1788.

ELIZABETH ZIMMERS.

No. 16.

The certificate of Michael Baltzel, Turner, which establishes the time of Mrs. Zimmers' fact.

Fredericktown, 17th April, 1788.

This may certify that I, the subscriber, turned works for Mr. James Rumsey, of Virginia, for his steamboat, viz., a round piece of wood about 8 inches diameter, and about 4 feet long, &c., to round his copper works upon. Said turning was done in March, 1786. As witness my hand.

MICHAEL BALTZEL.

No. 17.

The certificate of Mr. Jonathan Morris, innkeeper, which confirms the assertion in Governor Johnson's letter, that the "designed purpose of the cylinders, was a subject of pretty general conversation" in Fredericktown, and therefore, had it been prior to my petition to the Assembly of Maryland, the middle of December, 1785, Mr. Foy, the member of assembly resident in that town, must have known it, and the house have received information from him, when probably they might have assigned other reasons for rejecting my petition than mere bareness of finances. If all the machinery was ready to put on board, as Mr. Morrow swears, on the 1st December, it must have been a fact notorious to the whole town; but the following declaration shows that so far from being on board in December, 1785, it was shut up as a secret even so late as the latter end of March following; so that this "pretty general conversation," which Governor Johnson

speaks of, could not have happened until about this time, and all the evidences I produce confirm my assertion, that Mr. Rumsey did not begin his steam engine, until I had published my plan all through Maryland and Virginia. The certificate is as follows:

FREDERICKTOWN, 18th April, 1788.

This may certify, that I the subscriber, was towards the latter end of March, 1786, informed that Mr. Matthias Zimmers had begun some machinery for Mr. Rumsey's steamboat. Accordingly I called on Mr. Zimmers to see it, but was refused the sight of it, as it was then retained as Mr. Rumsey's secret; but was informed that it was begun in the beginning of the same month, this I declare to be the truth as near as I can recollect.—As witness my hand,

JONATHAN MORRIS.

No. 18.

The deposition of John Peters, who performed such parts of Mr. Rumsey's machinery as were made of tin.

FREDERICK COUNTY, Maryland, April 18th, 1788.

I the subscriber was a journeyman and worked for Mr. Matthias Zimmers, and began to work in the tin business, at the same time Mr. Zimmers did begin the copper works for Mr. James Rumsey, of Virginia, for his steamboat, which said coppers and tin works were begun in March, in the year 1786.

JOHN PETERS.

Sworn before me, Jacob Young, one of the justices for Frederick County, Maryland.

No. 19.

The deposition of John Frymiller, who was apprentice to Mr. Zimmers at the time he made the copper works for the steam engine, shewing not only that the works were begun and finished in a shop next to Mr. Tombough, but that no part of the said machinery was begun *before* the spring, 1786.

State of Maryland, Baltimore County.

On this twenty-sixth day of April, in the year of our Lord one thousand seven hundred and eighty-eight, before me the subscriber, one of the justices of the peace for the county aforesaid, personally appeared John Frymiller of Baltimore town, in said county, and made oath on the holy Evangelist of Almighty God, that during the time he was an apprentice to the late Mr. Matthias Zimmers of Fredericktown, in Frederick county and state aforesaid, deceased: when he the said Matthias Zimmers, made Mr. James Rumsey's machinery for the steamboat; that he, this deponent, did work at the said James Rumsey's machinery. That it was begun in the spring of the year 1786, and that no part of said machinery was begun before the time above mentioned, by the said Zimmers, to the best of his knowledge—and further that the said machinery was begun and finished in a shop adjoining Frederick Tombough's smith shop, (which said Tombough was as the deponent has been informed, in partnership in the smith's business at said time, with said Zimmers) in which said Matthias Zimmers had his coppersmith's fires for brazing, &c., and further this deponent saith not.

Sworn before me,

JOHN MOALE.

The following certificate proves that Mr. Rumsey's machinery was made by Mr. Zimmers, in Fredericktown, in the spring of 1786, there being but two coppersmiths in Fredericktown, viz: Messrs. Matthias Zimmers and Joshua Minshall, the certifier.

No. 20.

This may certify that I the subscriber, coppersmith, have resided in this town about three years, during which time there have no coppersmiths resided in the town, except Mr. Matthias Zimmers and myself, and that I was knowing to Mr. Zimmers making copper works for Mr. Rumsey's steamboat, and am of opinion it was late in the spring or summer, before said Rumsey took said works from Mr. Zimmers in the year 1786. As witness my hand, 29th April, 1788, at Fredericktown, Maryland.

JOSHUA MINSHALL.

The foregoing testimonies, I presume, will carry full conviction that Mr. Rumsey has shifted his dates, and has got two of his workmen to swear to it. For Messrs. Barns and Morrow, if they had consulted their accounts, must have found that they had made a lapse of a whole year at least, and that the December, 1785, which they speak of must have been December, 1786. The circumstance of being stopped by the ice proves it to have been in the winter, and therefore must inevitably have been in the winter of 1786. But this was too late a date to serve their purpose of supplanting my claims and just rights, which I mean to maintain under the laws I have already obtained, and have no doubt of succeeding in my applications to the other assemblies, when they come to see my proofs, and Mr. Rumsey's false datings. He has mentioned the obtaining part of his works from Baltimore, where I can also show he has used the same want of candor, and it will confirm the proofs from Fredericktown.

It appears the four large cocks for his steam pipes and works, were bespoke of Christopher Raborg, in Baltimore, by Mr. Barns, who, the better to conceal the "designed purpose of the cylinders," told him they were for the Warm Springs in Virginia. Perhaps a little mental reservation might cover this deviation from fact. But Mr. Raborg had no account thereof and could not give the time with precision, though he believes they were made in the fall of 1785. The certificates, No. 20 and 21, which follow, prove that the time was certainly in the spring, 1786. As these certificates appear to refer only to cocks made for the Warm Springs, I had considerable doubts about admitting them into my defence; because Mr. Rumsey on finding that I proved them to be made in March, 1786, might (if he pleased) adhere to Mr. Barns's declaration of their being made for the Warm Springs and not for the steamboat. But I am now happy in having a confirmation under Mr. Rumsey's own hand, published in Mr. Oswald's paper of the tenth instant, where he informs the public, "Mr. Raborg was the person who undertook to make cocks for my steamboat, and by him I shall prove that they were finished at the time he mentioned to Mr. Fitch, viz: the fall of 1785."

Christopher Raborg's certificate is as follows:

No. 21.

This may certify, that Mr. Joseph Barns did bespeak of me four brass cocks, which he said were for the warm springs—that being disappointed by my journeymen, I got them made by Mr. Charles Weir & Co. Said cocks I do believe were made in the fall 1785, but have no charge made of them to ascertain the time with precision. This I assert, as witness my hand, at Baltimore, this 26th day of April, 1788.

CHRISTOPHER RABORG.

No. 22.

The certificate of Charles Weir, who speaks with tolerable certainty of the works being made in the spring of 1786.

This may certify that when I was in partnership with Isaac Causten I made four brass cocks for Mr. Christopher Raborg, for which I received the money, and charged myself with it—that my books are destroyed, and I cannot exactly recollect the time of their being made, but am persuaded it was early in the spring of the year 1786. This further may certify that I never made the exact number of four cocks for said Raborg, except only that one time. As witness my hand, at Baltimore, 26th day April, 1788.

CHARLES WEIR.

No. 23.

The certificate of Isaac Causten, who ascertains upon good grounds that the said work was done and charged on the 29th March, 1786.

This may certify, that I, the subscriber, with my partner, Charles Weir, made four brass cocks for Mr. Christopher Raborg, and charged them in the partnership account. Said book has since been destroyed, but from some loose papers I found charged to Mr. Raborg on the company's account, on the 29th March, 1786, four brass cocks, which, with other accounts, I have drawn out into my day book. Neither have I made the exact number of four cocks for him at any other time. In witness whereof I have hereunto set my hand this 26th day of April, 1788.

ISAAC CAUSTEN.

The reader will, doubtless, on an examination of the two pamphlets, perceive things in their true light, and that Mr. Rumsey made no pretence to use steam till after the failure of his boat on the principles exhibited at Bath, after I had invested myself with an undoubted title, by exhibiting the invention to Congress in August, 1785, and had published it to the States of Virginia and Maryland, who became virtually bound to secure me the right. Mr. Rumsey prosecuting his works in secret, and appearing at this late day with antedated facts, is a full proof that he had no claim to the invention—nor is there any one principle of law or equity on which he can found his pretensions. If he claims it on his *thought*, Mr. Paine, Mr. Henry, and Mr. Andrew Ellicott are long before him: if on forming drafts without communicating them to the public, he must acknowledge Mr. Henry's priority: but if it is to be decided, as it certainly must, by the established mode of public declaration on record, my title is indisputable. Being, therefore, certain of the stability of my claim, founded on the modes established in justice and policy, I have not a doubt but my country will secure and protect the right she has so deliberately granted to me. Under this security I embarked my time, my fortune and reputation; and, thus embarked, I am certain I have nothing to fear—but shall depend with full confidence on a continuance of that justice which is due to the rights of the citizen and the honor of my country.

JOHN FITCH.

PHILADELPHIA, 10th May, 1788.

POSTSCRIPT.

Since this Pamphlet went to press a second edition of Mr. Rumsey's pamphlet has been printed in this city, in which a short advertisement is prefixed, and an extract of his own letter to General Washington, which are as follows:

ADVERTISEMENT.

The following pages are taken from a pamphlet published in Virginia, to prove the author's prior right of applying steam to propel boats, &c., as well as to establish the principles on which he has done it. A few copies were then thought sufficient for that purpose, but as Mr. Fitch intends to answer the pamphlet, it is therefore necessary to re-publish as much of it as respects Mr. Fitch, which is done with no other variation from the original than to correct a few of the omissions and mistakes that were introduced into the first publication, from the hurry in which it was done, (as the author at that time could not attend the press,) and was circulated with an apology annexed to the postscript, for the imperfection of the impression. Of these corrections perhaps Mr. Fitch may take some notice; if he should, such part of the old pamphlet shall be re-printed, (verbatim,) to convince the public that the subject has not been varied, but a little better explained. The sophistry in Mr. Fitch's reply (should it contain what he informs me it does) is evidently calculated to make impressions unfavorable of me on the public mind, and to wound the reputation of several respectable characters. I must therefore beg the public's indulgence to suspend their opinion for a few weeks, when I shall have it in my power to lay before them such additional statement of facts, supported by such respectable testimony, as will incontestibly prove the unjustifiable steps Mr. Fitch has taken to deprive the author of his discoveries, and to injure the reputation of sundry gentlemen.

No. 19 is added to this publication—it is part of a letter wrote by the editor to his excellency General Washington, dated the 10th of March, 1785, which will show that the editor had fixed on a method of applying steam to propel a boat before Mr. Fitch knew (from his own account of the matter,) that steam had ever been made use of for any purpose whatever. How, then, is it possible he should have the prior right to this discovery? If it is asked who made the most promising experiment, it would be found that my experiments, two years since, exceed the best he has ever made. Must I then be deprived of my discoveries, which are substantial, because I endeavored to keep them secret until perfected? Justice will never suffer it. I therefore with the greatest confidence, look up to my countrymen for their support, according to the merits of my cause—and have the honor of subscribing myself their most devoted humble servant,

JAMES RUMSEY.

Philadelphia, May 7th, 1788.

As to his advertisement, I have fully proved that he made no experiment on his boat with steam two years ago, his machinery being at that time in Fredericktown. And his boat so far exceeding mine will also appear a wrong assertion, as the greatest distance he pretends to have propelled his small boat per hour is four miles, and that appears to be mere ideal estimation. In my boat, by the same force applied, I let out three miles and a quarter per hour by the log line. This is departing from the merits of the dispute—but to convince the public of his assertion on this head being absurd, I shall introduce certificates No. 24, 25, 26. As to his request of suspending the public opinion, I rest my cause on solid and fair conclusions drawn from his pamphlet, a very safe and candid judgment may be formed of the merits of Mr. Rumsey's pretensions, it being evident that all his false assertions and false dating will never prove that two and two are not four.

No. 24.

These may certify that the subscriber has frequently seen Mr. Fitch's steamboat, which with great labor and perseverance he has at length completed, and has likewise been on board when the boat was worked against both wind and tide, with a very considerable degree of velocity, by the force of steam only. Mr. Fitch's merit in constructing a good steam engine, and applying it to so useful a purpose, will no doubt meet with the encouragement he so justly deserves from the generosity of his countrymen, especially those who wish to promote every improvement of the useful arts in America.

DAVID RITTENHOUSE.

Philadelphia, December 12th, 1787.

No. 25.

Having also seen the boat urged by the force of steam, and having been on board of it when in motion, I concur in the above opinion of Mr. Fitch's merits.

JOHN EWING.

No. 26.

From the well known force of steam, I was one of the first of those who encouraged Mr. Fitch to reduce his theory of a steamboat to practice, in which he has succeeded far beyond my expectations. I am now fully of opinion that steamboats may be made to answer valuable purposes in facilitating the internal navigation of the United States, and that Mr. Fitch has great merit in applying a steam engine to so valuable a purpose, and entitled to every encouragement from his country and countrymen.

ANDREW ELLICOTT.

Philadelphia, December 13th, 1787.

Copy of Mr. Rumsey's extract, No. 19.

The following is part of a letter wrote by the editor, to his Excellency, General Washington, dated the 10th of March, 1785.

After mentioning that kind of machine for propelling boats, which the General had seen a model of, I proceed to say—"I have taken the greatest pains to perfect another kind of boat, *upon the principles I mentioned to you at Richmond*, in November last, and have the pleasure to inform you that I have brought it to great perfection; it is true, it will cost something more than the other way, but, when in use, will be more manageable, and can be worked with as few hands; the power is immense—and I have quite convinced myself that boats of passage may be made to go against the current of the *Mississippi* or *Ohio* rivers, or in the *Gulf Stream* (from the *Leeward* to the *Windward Islands*) from sixty to one hundred miles per day. I know this will appear strange and improbable to many persons, yet I am very certain it may be performed, besides, it is simple (when understood) and is also strictly philosophical.

The principles of this boat I am very cautious not to explain, as it would be easily executed by an ingenious person.

The plan I mean to pursue, is to put both the machines on board of boats* built on a large scale, and then, sir, if you would be kind enough to see them make actual performances, I should not doubt but the assemblies would allow me something handsome, which would be more advantageous to the public than to give me the exclusive right of using them."

As to the extract of his letter to General Washington of the 10th of March, 1785, it is nothing more than a declaration that he intended something; that even if it was steam he meant to make use of, it was a profound secret which he was then cautious not to explain. But let us take a view of this letter, and I have no doubt but from the very wording of it, it will very clearly appear that the utility of steam (if that was what he meant to convey) was with him at that time very doubtful, and upon which he could have no kind of dependence; and holding up the idea of secrecy so punctually, least some artist, more ingenious than himself, should complete a steamboat before him, shows indubitably that he conceived it as an agent at a great distance from him, and upon which he had no reliance, or from which the public could then expect no advantage, and indeed I am confident that his ideas of a steam engine (if any he had, which I much doubt) were very inferior to Messrs. Henry's, Ellicott's, Paine's, &c., in the year 1778, but as no publication to the world took place by them, they are candid enough not to claim it as an invention of theirs. But should I even go so far as to admit he had thoughts of applying steam, and that he intended exhibiting a steamboat to General Washington, it was nothing more than an intention he held in secret, on the 10th of March, 1785, and even by his declarations to Governor Johnson, if they were as early as October or November, 1785, he kept it then a secret—nothing was imparted to the public, therefore nothing due from them. I had long before declared my intentions through Congress, and thereby invested myself with the indisputable title to my invention throughout the United States. Maryland and Virginia had virtually pledged the honor of their states to secure me in this right. Virginia has since supported that honor, by cheerfully passing a law for that purpose, and Maryland, I doubt not, as also other of the United States, will pay equal regard to justice and policy.

N. B. As the application of steam to vessels will undoubtedly claim the early attention of the world, as the least expensive and safest mode of navigation, I doubt not but the impartial public will yet, with pleasure, secure in me those rights, for which security, had I applied on the first exhibition of my scheme, would have been granted without murmur or delay; but as a confidence in the honor of my country, and a want of finance, were then the preventatives, the delay certainly will not operate now against me, as the utility of the invention more clearly appears, and thereby the attention of my country more reasonably claimed.

The following certificates were omitted in their proper places.

No. 1.

I do certify, that as I was returning with John Fitch from Neshamany meeting some time in April, 1785, as near as I can recollect the time, when a gentleman and his wife passed by us in a riding chair; he immediately grew inattentive to what I said. Some time after he informed me that at that instant the first idea of a steamboat struck his mind.

JAMES OGILBEE.

*There were two boats connected, in the model I exhibited at Bath, in September, 1787, which is the reason I speak of boats in the plural, as experiment had convinced me that a single boat would not succeed on that principle.

No. 2.

An extract of a letter from James Scout.

You are desirous of knowing from me when the first thought of a steamboat came in your head; this I cannot tell, but this you told me; that in the month of April, 1785, you were travelling down Street road, in company with Mr. James Ogilbee, and Mr. Sinton passing you on Street road, that then the first thought occurred to you of a steamboat, and the month of May or June following, you showed me a plan of your machine on paper; this truth I shall seek no further testimony to support; 'tis too generally known: let them that doubt it come and hear more from

Your humble servant,

JAMES SCOUT.

April 15th, 1788.

No. 5.

This is to certify, that Mr. John Fitch called upon William Henry, Esquire, my late husband in his life time, about two years and an half since, when Mr. Fitch showed to him drafts and a model of a machine how to propel a boat through the water. And further, that I have frequently heard Mr. Henry applying steam as a means to urge boats through the water by force of it, and that he had proposed laying a model of a machine for that purpose, before the Philosophical Society, long before Mr. Fitch called upon him.

Witness my hand, this 12th day of May, 1788.

ANN HENRY.

Test,—Jno. Jos. Henry.

FINIS

JACOB PERKINS.

This eminent inventor died during the past year. The following tribute to his memory is entitled to a place here, inasmuch as Mr. P. took out seventeen American patents—the first one in 1799, for nail making machinery.

"A simple and unostentatious notice of the demise of this remarkable man, is all the tribute that the public press has yet paid to his memory. The merits of our ingenious countryman deserves more. He has passed quietly away from the scene of his labors; but he has left his mark upon the age.

He was descended from one of the oldest families of that ancient portion of the State of Massachusetts, the county of Essex—a region of stubborn soil, but rich in its production of *men*. Matthew Perkins, his father, was a native of Ipswich, and his ancestor was one of the first settlers of that town. Matthew Perkins removed to Newburyport early in life, and here Jacob Perkins was born, July 9th, 1766. He received such education as the common schools of that day furnished, and nothing more. What they were in 1770 may be guessed. At the age of twelve he was put apprentice to a goldsmith of Newburyport, of the name of Davis. His master died three years afterwards; and Perkins at fifteen, was left with the management of the business. This was the age of gold beads, which our grandmothers still hold in fond remembrance—and who wonders? The young goldsmith gained great reputation for the skill and honesty with which he transformed the old Portuguese *joes*, then in circulation, into these showy ornaments for the female bosom. Shoe-buckles were another article in great vogue; and Perkins, whose inventive powers had begun to expand during his apprenticeship, turned his attention to the manufacturing of them. He discovered a new method of plating, by which he could undersell the imported buckles. This was a profitable branch of business, till the revolutions of fashion drove shoe-buckles out of the market. Nothing could be done with strings, and Perkins put his head-work upon other matters.

Machinery of all sorts was then in a very rude state, and a clever artisan was scarcely to be found. It was regarded as a great achievement to effect a rude copy of some imported machine. Under the old confederation, the State of Massachusetts established a mint for striking copper coin; but it was not so easy to find a mechanic equal to the task of making a die. Perkins was but twenty-one years of age when he was employed by the government for this purpose; and the old Massachusetts cents, stamped with the Indian and the eagle, now to be seen only in collections of curiosities, are the work of his skill. He next displayed his ingenuity in nail machinery, and at the age of twenty-four invented a machine which cut and headed nails at one operation. This was first put in operation at Newburyport, and afterwards at Amesbury, on the Merrimac, where the manufacture of nails has been carried on for more than half a century.

Perkins would have realized a great fortune from this invention, had his knowledge of the world and the tricks of trade been in any way equal to his mechanical skill. Others, however, made a great gain from his loss; and he turned his attention to various other branches of the mechanic arts, in several

of which he made essential improvements, as fire engines, hydraulic machines, &c. One of the most important of his inventions was in the engraving of bank bills. Forty years ago counterfeiting was carried on with an audacity and a success which would seem incredible at the present time. The ease with which the clumsy engravings of the bank bills of the day were imitated, was a temptation to every knave who could scratch copper; and counterfeits flooded the country, to the serious detriment of trade. Perkins invented the stereotype check-plate, which no art of counterfeiting could match; and a security was thus given to bank paper which it had never before known.

There was hardly any mechanical science in which Perkins did not exercise his inquiring and inventive spirit. The town of Newburyport enjoyed the benefit of his skill in every way in which he could contribute to the public welfare or amusement. During the war of 1812 his ingenuity was employed in constructing machinery for boring out old honeycombed cannon, and in perfecting the science of gunnery. He was a skilful pyrotechnist, and the Newburyport fireworks of that day were thought to be unrivalled in the United States. The boys, we remember, looked up to him as a second Faust or Cornelius Agrippa; and the writer of this article has not forgotten the delight and amazement with which he learned from Jacob Perkins the mystery of compounding serpents and rockets.

About this time a person named Redheffer made pretensions to a discovery of the perpetual motion. He was traversing the United States with a machine exhibiting his discovery. Certain weights moved the wheels, and when they had run down, certain other weights restored the first. The experiment seemed perfect, for the machine continued to move without cessation; and Redheffer was trumpeted to the world as the man who had solved the great problem. Perkins gave the machine an examination, and his knowledge of the powers of mechanism enabled him to perceive at once that the visible appliances were inadequate to the results. He saw that a hidden power existed somewhere, and his skilful calculations detected the corner of the machine from which it proceeded. "Pass a saw through that post," said he, "and your perpetual motion will stop." The imposter refused to put his machine to such a test: and for a sufficient reason. It was afterwards discovered that a cord passed through this post into the cellar, where an individual was stationed to restore the weights at every revolution.

The studies, labors, and ingenuity of Perkins were employed on so great a variety of subjects, that the task of specifying and describing them must be left to one fully acquainted with the history of the mechanic arts in the United States. He discovered a method of softening and hardening steel at pleasure, by which the process of engraving on that metal was facilitated in a most essential degree. He instituted a series of experiments by which he demonstrated the compressibility of water, a problem which for centuries had baffled the ingenuity of natural philosophers. In connexion with this discovery, Perkins also invented the bathometer, an instrument for measuring the depth of the sea by the pressure of the water; and the pleometer, to measure a ship's rate of sailing.

Perkins continued to reside in his birth place till 1816, when he removed from Newburyport to Boston, and subsequently to Philadelphia. His attention was now occupied by steam machinery, which was beginning to acquire importance in the United States. His researches led to the invention of a new method of generating steam, by suddenly letting a small quantity of water into a heated vessel.

After a short residence in Philadelphia, he removed to London, where his experiments with high pressure steam, and other exhibitions which he gave of his inventive powers, at once brought him into general notice. His uncommon mechanical genius was highly appreciated; and his steam-gun was for some time the wonder of the British metropolis. This gun he invented in the United States, and took out a patent for it in 1810. It attracted the notice of the British government in 1823, and Perkins made experiments with it before the Duke of Wellington and a numerous party of officers. At a distance of thirty-five yards he shattered iron targets to pieces, and sent his balls through eleven planks, one inch thick each, and placed an inch apart from one another. This gun was a very ingenious piece of workmanship, and could discharge about one thousand balls per minute.

Perkins continued in London during the remainder of his life. He never became rich. He lacked one quality to secure success in the world—financial thrift. Everybody but himself profited by his inventions. He was, in fact, too much in love with the excitement of the chase to look very strongly at the pecuniary value of the game.

He died in London, July 30th, 1849. The name he leaves behind him is that of the *American inventor*. It is one which he deserves, and which is his true glory. He was entirely self-educated in science, and the great powers of his mind expanded by their innate force. For half a century from the hour of his birth he lived in the town of Newburyport. Here he grew up, acquired his knowledge, applied his genius to action, perfected his inventive powers, and gained all his early reputation. At the present day, when books are in the hands of every man, woman, and child, and the rudiments of scientific knowledge are presented to us in thousands of students' manuals, cyclopædias, periodicals, public lectures, &c., we can form no adequate notion of the obstacles which lay in the way of a young man beginning his scientific pursuits at the time when Perkins was a youth. Imagine the state of popular science in 1787, and some faint notion may be obtained of the difficulties which the young artist was compelled to encounter in the preliminary steps of every undertaking. The exact sciences were but slightly regarded, even by those who made pretensions to complete learning in those days; and a great proficient in the mechanic arts could only hope to be considered in the light of a clever carpenter or blacksmith. Men did not dream of such fame as that of Watt and Arkwright. It is much to the honor of his townsmen that Perkins was from his earliest days, held in the highest esteem by them. They fully appreciated his genius, and were proud to honor him. In the latter years of his life, when far removed from the land of his birth, his thoughts and feelings always turned homeward, and he never ceased to express the hope of returning to lay his bones in his native soil. His wish has not been gratified, but his memory will remain for ever connected with the spot."

PAPERS AND ABSTRACTS

RELATING TO

EARLY AMERICAN INVENTIONS.

FROM THE ARCHIVES OF THE STATES.

With the hope of collecting interesting matter relating to early American inventions from sources but little explored, and thereby adding to the value of this section of the annual reports, copies of the annexed circular (marked A) were addressed to the Governors of the several States and Territories of the Union; and of the one (marked B) to the United States Senators and Representatives.

[A.]

U. S. Patent Office, November 8th, 1849.

Sir,—Endeavoring to trace up the history of American inventions as a duty appertaining to this Bureau, and supposing that interesting facts may lie hidden in the archives of the various States, particularly in the records of patents, of which some are known to have been granted under Colonial rule, and others by more or less of the States, previous to their conceding the right to the General Government; I respectfully request to be furnished with copies of any such documents as may be on file in the State Department of your State—the expense of which will be cheerfully borne by this Office.

It is well known that the application of machinery to many branches of art was begun, and has been brought to its present degree of perfection, almost solely by the ingenuity and labors of our countrymen. I need hardly instance the working of lumber, improvements in ploughs, the cut nail, and card making mechanism; yet definite information respecting these and other inventions, while in their infancy, is entirely wanting.

It is necessary that this Office should possess information on these points, the law clearly requiring, though not in express terms, that descriptions of all known inventions should be within reach, that patents may not be granted for things previously secured. Irrespective of the light they will reflect on the origin of inventions to which they relate, and early struggles of inventors, an increasing interest will be attached to them as matters of enlightened curiosity.

Information respecting the forms of patents, length of time for which they were granted, fees paid, &c., will be highly acceptable; as also any thing relating to the early progress of the arts in your State.

In case no official documents of the kind are on file, may I beg the favor of your referring the subject to any literary or scientific society, or to private individuals who may be in possession of the information sought.

With sentiments of high regard,

I have the honor to be your obedient servant,

THOMAS EWBANK, *Commissioner.*

To his Excellency ———, *Governor of* ———.

(Note.—It is not known that patents were issued for inventions in Louisiana by the French, or in Florida, Texas and New Mexico by the Spaniards; but if any were granted, copies of them would be of unusual interest.)

[B.]

U. S. Patent Office, November 12th, 1849.

Sir,—A copy of the accompanying circular has been addressed to each of the Governors of the States and Territories of the Union, and I respectfully solicit your co-operation in furthering the objects sought to be accomplished. Whatever assistance or advice your more important engagements may permit you to give will be highly appreciated.

There are, it is believed, among your constituents, descendants of old inventors and patentees, who, having documents of the kind referred to in their possession, would be glad to have them filed in this office, and noticed in its reports, as an act of justice to the ingenuity and memories of their ancestors. I have the honor to be,

With sentiments of high regard,

Your obedient servant,

THOMAS EWBANK.

The subjoined highly interesting replies afford abundant proof that much valuable information now lying hid in the archives of the various States may in this manner be collected—furnishing a new stock of materials of great usefulness for future reports of this Bureau.

CONNECTICUT.

Office of Secretary of State,
Hartford, Conn., Nov. 12, 1849.

Sir,—I am directed by his excellency Governor Trumbull to acknowledge the receipt of your communication of the 8th instant, and in reply thereto to transmit such information relative to its subject matter of inquiry as the files and records of this Department may afford.

No separate record of patents or exclusive rights, as such, was made under our colonial government, although such rights were not unfrequently granted by the legislature for a limited term of years, by the passage of special acts or resolutions. The petitions upon which these acts were based are in most cases preserved on file, but rarely contain more than a general averment of discovery or improvement, and in no case are accompanied by specifications likely to prove serviceable to your department. Such petitions were usually referred to a committee, who, after an examination into the facts, reported in general terms favorably or adversely to the prayer of the petitioners. Between the years 1708 and 1789, many acts were in this way passed, granting exclusive rights for terms of from three to fifteen years, as the comparative importance of the discovery claimed, or the branch of manufactures proposed to be introduced, merited in the opinion of the committee.

I subjoin the action of the Legislature on a single petition, and one of the earliest on file, whence you may determine how far such record may be of service, and whether it be advisable to prepare and furnish to your department full copies or abstracts of all similar applications and grants.

In May, 1728, Samuel Higley, of Simsbury, and Joseph Dewey, of Hebron, petitioned for the exclusive right "of practising the business or trade of *steel* making" for twenty years, alleging that the first named petitioner had "with great pains and cost, found out and obtained a curious art by which to convert, change or transmute common iron into good steel, sufficient for any use, and was the very first that ever performed such an operation in America." This petition was accompanied by a certificate of several smiths who had furnished the petitioner with pieces of iron, which a few days afterwards were returned by him "converted into good steel; which was the first steel that ever was made in this country, that ever we saw or heard of, since which he hath made further experiments, taking from us iron and returning it in good steel." The Legislature thereupon granted an exclusive right for ten years,—"provided the petitioners improved the art to any good and reasonable perfection," within two years from the date of the act.

It is not unlikely that in the collections of the Connt. Historical Society may be found more full specifications of many early discoveries made by citizens of our State, than are preserved in this department, and at the next meeting of that Association, your communication will be laid before them, that an examination may be made with reference thereto.

I am sir, very respectfully your obedient servant,

J. H. TRUMBULL, *Clerk*.
For Roger H. Mills, *Sec'y of State*.

Hon. Thomas Ewbank, *Comm'r of Patents*.

(To this communication the following reply was forwarded.)

U. S. Patent Office, 16 Nov., 1849.

Sir:—I beg to acknowledge the receipt of your interesting letter of Nov. 12th, and to thank you for the prompt attention paid to the circular from this Bureau, to which your letter refers. The information communicated by you is of an important character, and I have thought it advisable to request that you will have full copies made of all applications and grants similar to that you subjoin, which may be on file in the records of your department. They cannot fail to be highly interesting and useful.

Assuring you that I shall be most happy to reciprocate your kindness in this matter,

I remain very respectfully your obedient servant,

THOMAS EWBANK.

Hon. Roger H. Mills, *Sec'y of State Conn.*

NEW YORK.

SECRETARY'S OFFICE, Albany, 26th Nov. 1849.

DEAR SIR:—Your circulars dated 8th and 12th inst., requesting copies of any records in this department of early patents for inventions issued by this State, have been duly received.

It will, I beg you to be assured, afford me the highest gratification to be aiding in any way to the success of your enquiries, and whatever we possess here of a nature to interest you, will be most readily forwarded.

In the second volume of the documentary history of this State, now in press, and which is printed by order of the Legislature, will appear a series of papers and illustrations relating to the opposing claims of James Rumsey and John Fitch, to the credit of having first applied steam as a motive power to boats, &c.

These papers consist in part of James Rumsey's pamphlet and Mr. Fitch's reply, also in pamphlet form. Though these pamphlets are already in print, we republish them, as they form a part of the evidence laid before the N. Y. Legislature in 1788-9 on these and other such claims, and more especially as they are connected with a number of other papers, such as certificates, reports, letters and petitions which have never been published heretofore, as far as I am informed.

I send you in advance, copies of all these documents, and to enable you the more readily to distinguish the printed from the manuscript evidence laid before the Legislature, I annex hereunto a list of the latter class of exhibits.

I am unable at present to say if there be any papers of the description you desire, among our colonial records. These are now in progress of arrangement, preparatory to being bound and catalogued, and if any be found I shall have copies forwarded. The petition of one Mash, an old inventor in 1692, to Gov. Fletcher for aid for an "engine" which you will find herewith, is sent rather as a curiosity for its style, than as possessing any other particular merit. With great regard dear sir,

Yours most truly,

CHRISTOPHER MORGAN, *Sec'y of State.*

THOMAS EWBANK, Esq., *Comm'r Patents*, Washington, D. C.

From Manuscript Documents in the Secretary of State's Office, Albany.

Copy of an application to the Governor of New York, in 1693, for aid to perfect an invention to increase the speed of vessels.

These are to accquaint the Gouernor yt I am about makeing A small vessell that shall saile faster than all others by Aboundance.

According as I have allreadye acquainted you with all—Now In as mouch as This Exsolent art that I have found out will bee mightily for the Honour and profite of the King and Kingdome of England, and Likewise it will be A meaines to Aduance New York.

Therefore my Requist is, To the Gouernor That he would bee plased In the king's behalfe to let me have as much saill cloth as will make me saills and a Little small riggaine, all which will not coste Aboue seuen pounds.

Now the Chifest reason why I make this Littell Vessell is to make ye Gouernor sencable That I can doe by my art as I have formarly said, And then if the Gouernor will be pleased to acquaint the king therwith, It may doe well.

I pray you Gouernor do not slight This my art, Least it prove to the kings disaduantaige; and Hender yor selfe of benifit that may bee got thereby; for ther hath been many arts Heretofore found out, That was slighted and thought as Imposable As this cane bee, before thay was discoured; as for instancs, at first, who could A beliued that ye wide otione should be crost by art of shiping as it is at this time, and likewise who could beliue That such Grat things should bee done by art of Gunpowder as is, and was not ye man of famus memory, C. C. which dicoured This Amiricay slighted by England, but Imbraced by spaine and portaingall to ther great Honor and profite, and many others Grat discoueryes of Arts That might bee instanced that made Europe to flowrish Aboue other parts of ye world that haue not had the aduantage of such Ingenus men Amoungst them; I pray denie me not of saills, and if I doe not perform what I proposed, Then I will be bound to pay you double for yor damage and yor sails Againe.

JOHN MASH.

JUNE ye 6 day, 1693.

If you please to lett me haue answer by this bearer.

[Addressed]—To The Gouernor of N. Yorck. These

[Endorsed,]—John Mash and his Engine, 7£.

[A true copy of the original in the Secretary of State's Office, Albany, N. Y. E. B. O'CALLAGHAN.]

[From N. Y. Council Minutes, Vol. 8, 11th Feb'y, 1700.]

John Marsh having preferred a petition to this board, praying the Liberty to erect a Mill to go with the Tyde, of such a nature as hath not as yett been used, and desired that for his encouragement he may have a patent for the doing thereof, and for the prohibiting all persons to do the same for a term of years; his Excellency and Councill, on consideration thereof, do promise him Incouragement in the premises, so farr as they can reasonably do the same, and his Excellency doth promise to use his Interest with the Assembly, in their next session, for the procuring an Act for the Incouragement thereof, provided he pay a reasonable quitt-rent to his Majesty, and do perform the same in twelve months.

[NOTE.—The above Marsh was a Carpenter. He is the same that submitted an application to Fletcher, relative to some engine he had invented.]

EARLY STEAM.

The Rumseian Society, Philadelphia, to the Speaker of the House of Assembly, N. Y.

[N. Y. Assembly Papers, Miscellaneous Vol. 3.]

September 23d, 1788.

James Rumsey an ingenious gentleman, a native of Maryland, but lately from Virginia in December last, exhibited before a number of respectable characters in Maryland and Virginia, the effects of steam in propelling a boat of considerable burthen against the current of the river Potomac, and models of machines for the raising water to a great height, and in large quantities by the force of steam, in both which a boiler upon entirely new construction in-

vented by himself, is used with the greatest apparent probability of far exceeding all others heretofore known, not only in point of force but in the smallness of the quantity of fuel necessary to generate the steam.

He came to this city some months ago with drafts and descriptions of his several inventions, and communicated them to a number of gentlemen here, who struck with the simplicity of his several contrivances, and the great advantages with which they might be applied to many useful purposes, agreed to afford him some assistance in carrying his schemes into execution. To this end the persons, a list of whose names is herewith sent, formed themselves into a company, by the name of the *Rumseian Society*, and appointed us a committee of correspondence to further the design in distant places.

As steam engines are now used in Europe not only for the purpose of raising water from mines of great depth, but for a variety of other mechanical purposes where a strong force is necessary and where water falls were formerly applied; we thought it advisable that James Rumsey should immediately go thither to secure to himself any advantages which might result from an invention so extensively useful in that country, and he accordingly sailed in the month of May, in a vessel bound for London; before he took his departure he signed a petition, which will be presented to the honorable the legislature of your state, stating his several inventions, and praying an act may be passed granting him the exclusive privilege of making and vending them for a reasonable term of years; and at the same time a power of attorney was executed and sent by him to Dr. James McMechin, Joseph Barnes, and Charles Morrow, Esq., authorising them or either of them to attend in person, and solicit for him the granting the prayer of his petition. Joseph Barnes we are informed is a very ingenious mechanic, who has been employed by James Rumsey in constructing his several machines, and is perfectly acquainted with all his inventions, and has abilities adequate to the construction of them in the absence of the inventor. He is also in possession of the models and drafts necessary to show the utility of them, and as soon as exclusive rights therein, for a reasonable term of years shall be obtained from the honorable the legislature of the State of New-York, he will be ordered to attend, as well to carry the said machines into effect as to instruct suitable persons to construct them in his absence.

As the promotion of useful discoveries in the arts and sciences, is an object worthy the attention of enlightened men, and accordingly has in all ages and countries met with patrons amongst those most distinguished for their knowledge, good sense and patriotism, we doubt not but that a scheme, that promises so much improvement, will meet with advocates and support in the general Assembly of New York, over which you so honorably to yourself and to them preside. And we therefore take the liberty to request your countenance to James Rumsey's petition, so far as the prayer thereof shall seem to you consistent with the public good, and if it should not be contrary to the rules of the House, we should take it a particular favor that this letter be read from the chair, in order to bespeak the favorable attention of the honorable members to the subject.

We are with the greatest respect, your assured friends and obedient humble servants,

MIERS FISHER.
BENJAMIN WYNKOOP.
LEVI HOLLINGSWORTH.

The Hon. JOHN LANSING, Esq.,
Speaker of the House of Assembly.

A LIST OF THE RUMSEIAN SOCIETY.

His Excellency Benj. Franklin, Esq.
Arthur St. Clair.
William Bingham.
Benjamin Wynkoop.
James Tunchard.
John Jones.
Levi Hollingsworth.
Joseph James.
John Wilson.
George Duffield.
Reed & Forde.
Woodrop & Joseph Sims.
William Redwood & Son.
William Barton.
Richard Adams.
Samuel Wheeler.
Samuel Magaw.
Adam Kuhn.
Miers Fisher.
M. F. for Robert Barclay of London.
Charles Vancouver.
Burgis Allison.
John Vaughn.
John Ross.
William Turner.

Endorsed.—A letter from Miers Fisher and others of the Rumseian Society at Philadelphia to the Speaker of the Assembly in New York.

In Assembly, December 18th, 1788.—Read and referred with the petition of James Rumsey, to Mr. Livingston, Mr. Havens and Mr. Van Cortlandt.

[New York Assembly papers.]

No. 1.

PHILADELPHIA, October 18th, 1788.

We whose names are hereunto subscribed do certify that we have been in John Fitch's steamboat, of sixty feet in length, in the river Delaware, when the said boat was propelled through the water with a considerable degree of velocity, regularly and uniformly, without any manual labor, by the force of steam; and we are clearly of opinion that the rivers of America may be navigated by the means of steamboats, and that the present boat would be very useful on the western waters.

JOHN EWING,
ROB'T PATTERSON,
ANDREW ELLICOTT,
JOHN SMILIE,
DAVID REDICK,
JAMES HUTCHENSON,
T. Y. MATLACK,
CHARLES PETTIT,
J. B. SMITH,
DAVID RITTENHOUSE.

No. 2.

This may certify that, on the twelfth instant, we, the subscribers, went in John Fitch's steamboat from this city to the city of Burlington, twenty miles, in the space of three hours and ten minutes, there being upwards of thirty passengers on board; and that said boat was propelled through the water entirely by the force of steam; and from our own observations we are of opinion that the discovery which Mr. Fitch has made may be of much service to inland navigation.

JOHN POOR.
JOHN ELY.

PHILADELPHIA, October 18th, 1788.

No. 3.

On the 16th instant I was on board Mr. Fitch's steamboat, in the river Delaware, saw it perform, and I do certify that it was impelled by the force of steam at the rate of at least four miles an hour, against the strength of tide; and am fully convinced the force applied to that boat would be sufficient to carry it against the most rapid waters between the mouth of French Creek, on the Alleghany, and the mouth of Muskingum, on the Ohio; and that on an average, it would carry it between three and four miles an hour on any of the western waters.

JONA. HEART,
Capt. 1st U. S. reg't.

PHILADELPHIA, 18th Oct., 1788.

No. 4.

This may certify that I, the subscriber, was one of the committee appointed in March, 1786, by the General Assembly of this State, on the petitions of John Fitch and Arthur Donaldson, respecting their several schemes for the improvement of navigation by means of steam engines, when Mr. Donaldson produced his plan to the committee for drawing water in, at, or near, the bottom, and forcing it out abaft as a means of propelling a vessel forward.

The committee, having fully heard the petitioners, and afterwards viewed Mr. Fitch's model of an invention for moving a boat by means of a steam engine, agreed to make a report to the house in his favor.

JAMES IRVINE.

PHILADELPHIA, August 7th, 1788.

No. 5.

Mr. Fitch, in his explanation of this draft to me, before he presented it to the Philosophical Society, mentioned that his intention of conveying the waters from his forcing pump in a tube that passed through the fire, was that it might thereby be set a boiling before it entered in the receiver, lest the cold water, mixing with the boiling water in the receiver, should impede the generation of the steam.

JOHN EWING.

Endorsed: Presented to the society Sept. 27th, 1785.

R. PATTERSON, *Sec'y.*

No. 6.

I, William Cavenaugh, notary and tabellion public in and for the commonwealth of Pennsylvania, by lawful authority duly admitted and sworn, dwelling in the city of Philadelphia, in the said commonwealth, do hereby certify and attest unto all whom it doth or may concern, that the aforegoing writings, from No. 1 to 6, do contain just and true copies of original certificates to me, the said notary, bona fide produced by John Fitch, in the said certificates named; and that I have carefully compared the said copies with their respective originals, and do find them exactly to agree with each other. And I do hereby further certify that the several gentlemen who have signed and subscribed their names to the said certificates now are, or heretofore have been, in the posts, trusts, or employments hereinafter following their respective names, viz:

John Ewing, Provost of the University and Vice President of the Philosophical Society.

Robert Patterson, Professor of Mathematics and Natural Philosophy, and one of the secretaries of the Philosophical Society.

Andrew Ellicott, Professor of Mathematics and Astronomy in the Episcopal Academy.

John Smilee, present member of the honorable the Supreme Executive Council for the commonwealth of Pennsylvania.

David Redick, Vice President of the S. E. Council aforesaid.

James Hutchenson, one of the secretaries of the Philosophical Society.

Timothy Matlack, late secretary to the S. E. Council aforesaid.

Charles Petet, late member of Congress for the commonwealth aforesaid.

Jonathan Bayard Smith, late prothonotary of the court of common pleas for the city and county of Philadelphia.

David Rittenhouse, treasurer for the commonwealth aforesaid.

John Poor, teacher of the Young Ladies' Academy.

John Ely, teacher of Arch street School.

Jonathan Heart, Captain of the first United States regiment.

In testimony whereof, I, the said notary, have hereunto set my hand, affixed my seal of office of notary at Philadelphia aforesaid, the twelfth day of December, in the year of our Lord one thousand seven hundred and eighty-eight.

WM. CAVENAUGH,
Notary Public, &c, 1788.

To the honorable the Representatives for the commonwealth of Pennsylvania:

The petition of John Fitch, of the city of Philadelphia, humbly sheweth—

That he hath this morning seen with surprise in the public papers, that a petition has been presented to your honorable body by James Rumsey, praying you to grant him an exclusive right to the use of steamboats, the very right which, by special act of Assembly, passed the 28th of March, 1787, is vested in your petitioner, who is confident he need do no more than remind the honorable house that such a law exists, when he conceives it will be even unnecessary to pray that you will *not grant* that to another which has already been granted to him. Justice, honor, and dangerous precedent forbid the depriving an honest citizen of the fruits of his dear-earned labor, and to whom the faith of the government has been so solemnly pledged; the very attempt to draw the house into such a measure is, your petitioner conceives, offering them the greatest indignity. Your petitioner's property in the exclusive right to all steamboats in the State of Pennsylvania is as firmly established in him as the right of any man in the State to his house or his farm. He therefore trusts that honor of the house to protect him from so cruelly an intended injury. And your petitioner, as in duty bound, shall ever pray.

JOHN FITCH.

PHILADELPHIA, September 6th, 1788.

A true copy from the original, read September 6, 1788.

J. SHALLUS,
Ass't Cl'k of the General Assembly.

To the honorable the House of Representatives of the freemen of the commonwealth of Pennsylvania:

The petition of Henry Voight, of the city of Philadelphia, humbly sheweth—

That your petitioner has long turned his attention to improvements in mechanics, and he presumes was not an unuseful citizen during the war, as his various manufacturing machines will evince. Since the building of Mr. Fitch's steamboat, your petitioner has been much consulted, employed, and

in part interested in its completion; that during the many experiments and consultations about the best mode of constructing an engine on board a boat, your petitioner foresaw the great inconvenience of the usual mode of boiling water; and among a number of other projects, your petitioner conceived that water might be boiled in a pipe, a drawing of which he made in the spring of 1786, and in June showed it to Timothy Matlack, esq., and Mr. John Nacarrow, both of them gentlemen of great mechanical knowledge, from whom he hath obtained certificates; but Mr. Fitch was advised not to go out of the old way. The attempt, therefore, first made on the steamboat was with the accustomed heavy boiler, which so loaded the boat that Mr. Fitch determined to take it out and introduce a boiler more suited to the purpose. Accordingly, preparations were made for a *pipe boiler*, which is now executed, and the boat working with it, exactly on the principles and form exhibited to Mr. Matlack and Mr. Nacarrow. Your petitioner, hearing that a Mr. Rumsey was to come to town, and that he pretended to the exclusive right to a pipe boiler, your petitioner made an entry of his said boiler with the prothonotary of the court of common pleas of the city of Philadelphia, being told the copy-rights of books were there entered, and he conjectured such entry in a public office might secure to him in Pennsylvania the exclusive right to the same, as death, in such case, would not deprive the public of the discovery.

Your petitioner therefore humbly prays your honorable House will be pleased to grant to him and his heirs the exclusive right to the emoluments of the same for the term of fourteen years, or such term as the honorable House may think it deserves—and your petitioner, as in duty bound, &c.

HENRY VOIGHT.

PHILADELPHIA, September 6th, 1788.

A true copy from the original.

J. SHALLUS,

Assistant Clerk of the General Assembly.

The committee to whom was referred the petition of James Rumsey, John Fitch and Henry Voight beg leave to report—

That having examined the said petitions, and with great attention heard the parties in support of their respective claims, are unanimously of opinion that the law which grants to John Fitch an exclusive right to all boats propelled by fire and steam, hath not only secured unto him, his heirs, &c., the exclusive right to the method he had then invented, for the purpose of applying the powers of fire or steam in order to propel boats, but also whatsoever improvements he may make himself, or obtain from others, during the time limited by said law. And however improper so extensive a law may be in its principles, yet considering that upon a faith of the said law, several citizens have spent much labor and money, for which they are not yet reimbursed—and notwithstanding the Legislature may have a right to repeal laws which convey grants that are highly injurious to the general welfare, yet the resuming such legislative grants ought never to be done, unless upon the most pressing necessity.

Your committee therefore beg leave to offer the following resolutions, viz:

Resolved, That the prayer of the petition of James Rumsey be granted, excepting so far as it respects the propelling of boats by the force of fire or steam.

Resolved, That the prayer of the petition of Henry Voight cannot be granted.

The above is a true copy of the original report remaining on the files of the General Assembly.

J. SHALLUS, *Assistant Clerk.*

PHILADELPHIA, 13th December, 1788.

HONORED SIR,—As it is so very inconvenient for me to attend your Assembly this session, to answer the repeated vexatious claims of James Rumsey, I have taken the liberty to enclose to you, a petition to your honorable House, several certificates, a pamphlet, a report of the committee of Pennsylvania, &c., all which I pray you to lay before your honorable House.

There is one part of the pamphlet which may require a little explaining, as they hinge much, and their whole dependance of the pipe boiler rests on it; where speaking of Mr. Voight, and the pipe boiler, page 14, I say that I am indebted to him alone for the improvement, yet it cannot be denied but I laid a drawing of a pipe boiler before the Philosophical Society many months before he pretends to have [done so;] therefore I hope your House will not [conceive his words] to convey more than the very expression itself, [and that they] may not be construed instead of an improvement that they shall convey the idea that I am indebted to him for the invention.

I am hardly let in a belief that your honorable House will take up his petition, but refer it over to Congress; yet should they do it, I pray that I may be notified of it.

I also pray you, sir, as soon as this shall come to hand to let me have information by post, otherwise, for fear of miscarriage, in a reasonable time I shall have to be at the expense and trouble of forwarding another package to you, which will ever lay me under the obligation of subscribing myself

Your most devoted, much obliged, and very humble servant,

JOHN FITCH.

To the honorable the Speaker of the Assembly of New York.

Endorsed—John Fitch; papers and certificates relative to his steamboat—1789.

[Addressed]—Honorable Speaker of the General Assembly of the State of New York, at Albany.

This may certify that I have been made acquainted with Mr. John Fitch's plan of propelling vessels through the water by the force of steam: and if it should answer in practice as well as in theory, I am of opinion that it promises success, and deserves the notice of the Legislature.

CHRISTOPHER COLLES.

NEW YORK, February 22d, 1787.

State of Pennsylvania, in General Assembly,

Friday, September 8th, 1786, A. M.

The report, read September 6th, on the petition of John Fitch, was read the second time as follows, viz:

The committee on the petition of John Fitch report, that they have received his model of an invention for moving a boat by means of a steam engine, of which they entertain a favorable opinion.

That the said Fitch represents to the committee, that he has begun a boat for navigating on the river Delaware; but which, from the narrowness of his funds, he shall not be able to complete without some public assistance.

The committee, conceiving the design, if executed, will be of considerable public utility, recommend the following resolution:

Resolved, That a committee be appointed to bring in a bill to authorise the supreme executive council to direct payment of John Fitch's drafts to any amount not exceeding in the whole the sum of one hundred and fifty pounds, on proof made to them that the money so drawn for has been applied to the purpose of completing his steamboat, they taking his security for repayment thereof in twelve months.

And on the question, will the House adopt the same report? it was carried in the negative.

Extract from the minutes.

J. SHALLUS, *Assistant Clerk.*

Your committee on the petition of John Fitch report,

That they have viewed his boat, which he proposes to propel against the stream by the agency of steam, and although the apparatus necessary to the same is not yet so complete as to afford demonstration, yet your committee entertain no doubt of a full and effectual completion thereof.

In order, therefore, to encourage a further improvement in so useful an art, propose the following resolution:

Resolved, That the petitioner have leave to bring in a bill agreeably to the prayer of his petition.

The above is a true copy of the original remaining on the files of the General Assembly, and whereupon the resolution of the House of the 16th of November last was founded, Philadelphia, February 20th, 1787.

J. SHALLUS,
Assistant Clerk of the General Assembly.

The Committee to whom was referred the petition of John Fitch, of Bucks county, in Pennsylvania,

Report—That having examined the certificates and other papers presented to your Committee by the said John Fitch, they are of opinion that in order to encourage a further improvement in so useful an art; a bill be brought in for the purpose of granting to the said John Fitch an exclusive right of navigating boats by the force of steam or fire, for a certain time, agreeable to the prayer of his petition.

To the honorable the Legislature of the state of New York, in Senate and Assembly convened.

The petition of John Fitch, of Bucks county, in the state of Pennsylvania, humbly sheweth—

That your petitioner has lately invented a method of propelling vessels through the water by the force of steam, which he flatters himself is reduced to a moral certainty, and will be a very great improvement on navigation, and that he has a boat nearly completed, to navigate on the river Delaware by the agency thereof.

That the states of New Jersey and Delaware have patronised his scheme, so far as to give him an exclusive right for said boats for the term of fourteen years, and the state of Pennsylvania have passed a law for public consideration similar thereto—That your petitioner has invented a method of rowing boats by oars worked by cranks, which was never heretofore used, which applies not only to the force of steam, but the strength of a horse, or any other power, to equally as good advantage as men with oars, whereby inland navigation must be benefited nearly as much as the labor of horses is cheaper than the labor of men. Your petitioner therefore humbly prays that your honorable body will take into their consideration said improvements, and grant your petitioner such encouragement as in their wisdom shall seem proper. And your petitioner, as in duty bound, shall ever pray.

JOHN FITCH.

NEW YORK, February 21st, 1787.

[Endorsed,]—No 147. A petition of John Fitch, praying an exclusive privilege for a limited time of constructing vessels to be propelled through the water by the force of steam.

In Assembly, February 24th, 1787, read and referred to Mr. Sickles, Mr. Jones and Mr. Hamilton.

February 27th, 1787.—Mr. Sickles reported—see the report annexed—a bill was brought in pursuant to the prayer of the petition.

To the honorable the representatives of the state of New York, in General Assembly met:

Gentlemen:—Whereas your petitioner has formed a plan for facilitating the navigation of rapid rivers; he therefore doth propose to construct a certain species of boat, of the burthen of ten tons, which shall sail or be propelled by the combined influences of certain mechanical powers thereto applied, the distance of between twenty-five to forty miles per day, against the current of a rapid river, notwithstanding the velocity of the water should move at the rate of five miles per hour and upwards; with the burthen of ten tons on board to be wrought at no greater expense than that of three hands; and as a premium for so useful an invention, your petitioner prays for an act to pass this honorable house of Assembly, granting to your petitioner, his heirs and assigns, the sole and exclusive right of constructing, navigating and employing boats constructed after his new invented model, upon each and every creek, river, bay, inlet and harbor within the limits and jurisdiction of this commonwealth, for and during the term of ten years, fully to be completed and ended, to be computed from the first day of January, 1785, provided always, that the legislature of this commonwealth may at any time abolish the exclusive right herein prayed for, by paying to your petitioner, his heirs or assigns, the sum of ten thousand pounds in gold or silver, and your petitioner, as in duty bound, shall pray.

JAMES RUMSEY.

[Endorsed,]—*James Rumsey's petition to the state of New York.*

GENERAL WASHINGTON'S OPINION OF MR. RUMSEY'S INVENTION.

I have seen the model of Mr. Rumsey's boats, constructed to work against stream, examined the powers upon which it acts; been eye witness to an actual experiment in running water of some rapidity; and give it as my opinion (although I had little faith before) that he has discovered the art of working boats by mechanism and small manual assistance, against rapid currents; that the discovery is of vast importance, may be of the greatest usefulness in our inland navigation; and if it succeeds, of which I have no doubt, that the

value of it is greatly enhanced by the simplicity of the works, which, when seen and explained to, may be executed by the most common mechanic.

Given under my hand at the town of Bath, county of Berkeley, in the state of Virginia, this 7th of September, 1784.

GEORGE WASHINGTON.

A true copy compared with the original.

NEW YORK, Dec. 3, 1784.—I do certify that I have seen the original, of which the within is a copy, and believe the whole to have been written by General Washington, with whose handwriting I am perfectly acquainted.

BEN WALKER.

Formerly Aid de Camp to his Excellency, Gen. Washington.

[Endorsed,]—A copy of Gen. Washington's voucher.

PHILADELPHIA, Dec. 9th, 1788.

SIR:—I think it proper to inform you that I am about to set off for Albany, where I propose to be on the 15th inst. in order to present a petition to the Legislature of the State of New York in behalf of Mr. James Rumsey, praying a grant of the exclusive privilege of constructing and using within that State his model of propelling vessels by the force of steam, and the boilers by him invented for generating steam, in order that you may be heard if you think proper to attend. Yours, &c.,

JOSEPH BARNES.

Attorney for James Rumsey.

MR. JOHN FITCH.

On the tenth day of December, Anno Domini, one thousand seven hundred and eighty-eight, before me Clement Biddle, Esquire, Notary and Tabellion public for the commonwealth of Pennsylvania, duly commissioned and qualified, and one of the Justices of the court of common pleas for the city and county of Philadelphia, dwelling in the said city personally, came George Kemp, who being duly sworn on the holy Evangelists of Almighty God, did depose and say, that on the day of the date hereof, at the request of Joseph Barnes, attorney for James Rumsey, he went to the dwelling or lodging of Mr. John Fitch, and in presence of Joseph Barnes, attorney for James Rumsey as aforesaid, delivered to the said John Fitch a true copy of the paper writing contained on the other side hereof, and further saith not.

GEORGE KEMP.

Sworn as above before me quod attestor,

CLEMENT BIDDLE, Notary Public and J. C. C. P., 1788.

RICHMOND, November 17th, 1784.

Virginia,—To all whom it may concern.

I do hereby certify that a bill "giving unto James Rumsey, his heirs and assigns, the sole and exclusive right of constructing, navigating and employing boats after his new invented model, for the term of ten years, to be computed from the first day of January next," has passed the house of delegates of this State, with this proviso; "that the exclusive right therein granted, may at any time be abolished by the Legislature of this commonwealth, upon the payment unto the said Rumsey, his heirs or assigns, the sum of ten thousand pounds in gold or silver, and that the said bill is to be sent up to the Senate for their concurrence, as soon as they shall have formed a house.

JOHN TYLER, S. H. D

New York, ss:—James McMechen of Berkeley county, in Virginia, being duly sworn on the holy Evangelists, deposeth and saith, that the above is a true copy of a certificate in his possession, subscribed with the name of John Tyler, speaker of the house of delegates of Virginia, that the deponent knows the handwriting and subscribing of the said John Tyler, and does verily believe his name subscribed to the said certificate to be of the handwriting of the said John Tyler. That the said certificate was delivered to the deponent by the said James Rumsey therein named, at the city of Richmond, in Virginia, at which time and place several of the gentlemen of the house of delegates were present, and did see and read the said certificate—and further the deponent saith not.

JAMES McMECHEN.

Sworn the third day of December, 1784, before me,

JOHN MCKESSON, Notary Public.

To the honorable the Legislature of the State of New York in Senate and Assembly convened:

The petition of James Rumsey, of Berkeley county, in the State of Virginia, by James Barnes, at present of the city of Philadelphia, his attorney for the special purpose duly constituted, most respectfully sheweth—

That your petitioner hath invented a mode of raising water in great quantities to any height from below or above the surface of the earth, by means of steam acting upon two pistons at the same time, whereby mines may be drained, cities or farming grounds be watered, and mills supplied with a constant stream, at an expense far less than by any mode hitherto used or invented. A draft or specification of which invention, with an explanation of its use, is ready to be delivered to this honorable House, and to be filed on record in any public office which they may think most proper to preserve the same.

Your petitioner therefore prays that this honorable House will be pleased to give him leave to introduce a bill to be enacted into a law, granting and securing to your petitioner, his executors, administrators, and assigns, the exclusive right and privilege of making, constructing, and using machines for raising water, for all purposes whatsoever, by the action of steam applied to two pistons at the same time, in the manner and upon the principles by him invented and defined in the said draft, explanation and specification.

And your petitioner, &c.

JAMES RUMSEY,

By Joseph Barnes, his attorney.

[Endorsed]—No 52. 1788.

A petition of James Rumsey, by Joseph Barnes, his attorney, praying an exclusive right of making, constructing, and using machines for raising water, (by means of steam,) for all purposes whatever.

In Assembly, December 23d, 1788—read and referred to Mr. G. Livingston, Mr. Havens, and Mr. Van Cortlandt.

The committee to whom were referred the petition of James Rumsey, setting forth that he hath invented a new method of propelling boats by steam, and hath made improvements in divers engines and machines, and praying for an exclusive right to the same for a limited time; and the petition of John Fitch, praying that the prayer of the petition of the said James Rumsey

may not be granted; and the petition of John Stevens, setting forth that he hath invented a method of propelling boats by steam, that does not interfere with the pretensions of either the said James Rumsey or John Fitch; report—

That they have examined the petitions of the said James Rumsey and John Fitch, with the papers and affidavits accompanying the same, and are of opinion that the said James Rumsey hath by actual experiment ascertained the practicability of propelling boats by the agency of steam, in a mode and on principles different from those heretofore used by the said John Fitch; but that the act securing to John Fitch the exclusive right of propelling boats by the force of fire or steam for a limited time, is conceived in such general terms that it would be improper to vacate any part of the said grant, without giving both the parties a hearing. But the committee are further of opinion, that nothing in the said act, securing to John Fitch the exclusive right of propelling boats by fire or steam, can be construed to prevent the legislature from securing to James Rumsey, for a limited time, the exclusive right of generating steam by his new invented method of a pipe boiler. And, further, that they have examined the petition of John Stevens, and the draughts accompanying the same, and are of opinion that the method proposed by him for propelling boats by steam does not materially differ in its principles from the mode proposed by James Rumsey; and that he stands in the same situation with respect to John Fitch as the said James Rumsey. And, further, that the committee have prepared the draught of a bill securing to James Rumsey the exclusive right to his inventions for a limited time, which they have directed their chairman to report to the House.

To the honorable the legislative council and General Assembly of the State of New York:

The petition of John Fitch, of the city of Philadelphia, humbly sheweth,

That your petitioner received notice, on the 10th of this instant, from Joseph Barnes, attorney for James Rumsey, that he was about to petition your honorable House for an exclusive right to a steamboat and a pipe boiler.

Your petitioner humbly begs leave to represent, that by a law passed in the year 1787, your honorable legislature vested in your petitioner the exclusive right, for a term of years, of propelling vessels through the water by the agency of steam, which exclusive right hath also been granted him in the States of New Jersey, Pennsylvania, and Delaware, to whose several legislatures James Rumsey had made application, with a view of destroying the right of your petitioner, under the pretence of using a different mode in application of steam to the propelling of boats, and also under a pretence of an invention of boiling water in a pipe, for the purpose of creating steam, which idea of boiling in a pipe was by your petitioner laid before the Philosophical Society in Philadelphia, some months before the time assumed by the said Rumsey as the period of his first invention, and that the mode of propelling by forcing water out abaft, which he claims as his invention, was published by M. Bernoulli, in the year 1738, consequently, was open to common use, and thereby included in the law to your petitioner.

Your petitioner hath successfully opposed the said Rumsey in his applications to the said Assemblies, and hath hitherto preserved his rights inviolate. The report of the committee of seven, leading members of the honorable Assembly of Pennsylvania, after a debate of five days, supported on the side

of Mr. Rumsey by an eminent attorney at law, your petitioner begs leave to annex herewith. Since which he has made two fruitless attempts to destroy my just and legal rights in the States of Delaware and New Jersey.

In Virginia your petitioner hath also obtained an exclusive right, being the State in which said Rumsey resided, without the least opposition from him or any of his friends, notwithstanding from my first petitioning that Assembly, to obtaining the law, was more than one year and eleven months; your petitioner hath not hitherto been informed whether he has made application in that State or not, but doubts not, from the justness and stability of that honorable body, that they will not take his just rights from him without hearing the defence of your petitioner.

Your petitioner therefore humbly prays, that in case a petition should be presented by the said attorney, which may interfere with your petitioner's rights, either in the steamboat or the pipe boiler, so long in use in your petitioner's boat on the river Delaware, and a machine necessary for the completion of that design for which your law was given, he humbly prays to be heard in the defence of his rights. Your petitioner is perfectly willing to rest the justice of his claim either before your honorable House, or before the new Congress, if your honorable House should judge it most expedient to refer the same to them.

Your petitioner begs leave to observe, that such repeated vexatious applications seem calculated to divert your petitioner from pursuing the business of the boat, or to promote a clashing of laws amongst the different States, or to destroy his resources in defending his just rights, and prevent him from completing the great undertaking he has now on hands.

Your petitioner humbly begs leave to represent, that he hath expended a great portion of his time and a great sum of money in perfecting said boat, in full confidence of enjoying an uninterrupted possession of the several grants to him made.

Under the said confidence a number of gentlemen have advanced money, to a very considerable amount, hoping to benefit themselves as well as their country thereby. Your petitioner therefore humbly prays that the grant made to him, may not be permitted to be violated or invaded by a subsequent pretender, and considering the very great and expensive journey, and my inabilities to perform it, not only on account of the great expense but the infirmities of body occasioned by rheumatic pains, and the great confidence reposed in your honorable legislature of keeping inviolate the solemnities of their laws. However convenient it might be for me to attend, I am of opinion that it would be altogether unnecessary.

But should your honorable house think proper to take up the business, I humbly pray that I may be seasonably notified by your honorable house for the defence of my just and legal rights, and that they may not be taken from me without the opportunity of being heard in my own defence.

Your petitioner humbly begs leave to refer your honorable house to the annexed papers and pamphlets, accompanying this:

And your petitioner as in duty bound will ever pray.

JOHN FITCH.

To the honorable Legislature of the State of New York in Senate and Assembly convened.

The Petition of James Rumsey of Berkeley County, in the State of Virginia, most respectfully sheweth,—

That your petitioner has been several years employed, with unremitted attention, and at a great expense, in inventing, and bringing to perfection, sundry machines and engines; namely, one for propelling boats on the water, by the power of steam, which has been already accomplished in experiments, on a boat of about six tons burthen; another machine, constructed on similar principles, for raising water at a small expense, to be applied to the working of mills of different kinds, as well as to various useful purposes in agriculture; a new invented boiler for generating steam; and also other machines, by means of which, grist and sawmills may be so improved in their construction, by a very cheap, and simple machine, as to require the application of much less water, than is necessary in the common mode.

Your petitioner humbly conceives, that advantages of great importance to the agriculture and mercantile interests of the United States, may be derived from the use and employment, therein, of the before mentioned engines and machines; but he begs leave to represent to the honorable legislature, that, without some encouragement and support from the government, he will not be enabled to prosecute his discoveries, and to carry his aforesaid inventions and improvements into execution; whereby the public would be deprived of the benefits that might result from them; and your petitioner greatly injured, by the sacrifices he has made of his time and property.

Your petitioner deems it necessary, in this stage of his application to your honorable body, to enter into a detail of the nature and principles of the improvements, to which his present petition relates: he therefore takes the liberty of referring to the printed papers, herewith presented, for further information on the subject, and he flatters himself, that, on mature consideration, your honorable body will be fully satisfied, both of the practicability of his plans, and of their importance, as an object of great public utility. Under this impression, he respectfully solicits the patronage of the legislature of this State.

Your petitioner therefore prays, that the honorable legislature, as the guardians and trustees of the public prosperity, will be pleased to enact a law, granting as a reward for his before mentioned inventions and improvements, an exclusive right to him, his executors, administrators and assigns, of constructing, navigating and employing, for a certain term of years, within this State, the several boats, engines, and machines, by him invented and improved.

And your petitioner humbly submits to the judgment of this house, whether in consideration of the great expense he has already incurred in the prosecution of his objects, and the further charges which must necessarily attend the completion of his plans, the exclusive right prayed for, should not be vested for such a term, as might afford him an honorable compensation, proportioned to his services. JAMES RUMSEY.

[Endorsed,] James Rumsey's petition. 1788.

In Assembly, December 18th, 1788.—Read and referred with the pamphlet and papers attending the same, to Mr. G. Livingston, Mr. Havens and Mr. Van Cortlandt.

Extract from the printed minutes of the Assembly of the State of Virginia.

Saturday, November 15th, 1788.—"A petition of James Rumsey, by George Morrow his attorney in fact, was presented to the house and read, setting forth, that he is the original discoverer and inventor of sundry machines and engines, for propelling boats on the water by the power of steam; for which an exclusive privilege was granted by an act of the last Assembly, to a certain John Fitch, that he is well prepared to prove his prior claim to the said discovery, as also to manifest the advantages thereof, and praying that the act in favor of the said John Fitch, may be repealed.

"Ordered that the said petition be referred to Mr. Trage, Mr. Henry, Mr. Randolph, Mr. Carlins, Mr. Bland, Mr. White, Mr. David Stuart, Mr. Carrington and Mr. King, that they do examine the matter thereof and report the same, with their opinion thereupon to the House."

Thursday the 20th of November, 1788.—"The speaker laid before the house a letter and petition of John Fitch, praying that he may still enjoy the exclusive privilege of conducting steamboats within this state, which was granted to him, by an act of the last sessions of Assembly; and, that all attempts to interfere with this right, may be disregarded; which was read and ordered to be referred to the committee, to whom the petition of James Rumsey was referred."

Friday the 21st of November, 1788.—"Mr. David Stuart reported from the committee, to whom the petitions of James Rumsey and John Fitch were committed, that the committee had according to order, had the same under their consideration, and had agreed upon a report, and came to several resolutions thereupon, which he read in his place, and afterwards delivered in at the clerk's table, when the same were again twice read, and agreed to by the house as followeth:"

"Whereas, James Rumsey hath complained to the general Assembly, that the exclusive privilege granted to John Fitch, by the act entitled 'An Act granting to John Fitch the exclusive privilege of constructing and navigating boats impelled by fire or steam for a limited time,' hath been obtained to the injury of him the said James Rumsey, upon a misrepresentation, that the said John Fitch was the original author of the invention therein mentioned:

"And whereas, it appears to the satisfaction of your committee, from the testimony produced to them, that the said Rumsey's representation is just, and that he is the original author of the invention mentioned in the said act.

"Resolved, That it is the opinion of this committee, That the act passed at the last session of the general Assembly, entitled 'An Act granting to John Fitch the exclusive privilege of constructing and navigating boats impelled by fire or steam, for a limited time' ought to be repealed.

"Resolved, That it is the opinion of this committee, That the petition of the said John Fitch, in opposition thereto be rejected.

"Ordered, that a bill or bills be brought in, pursuant to the last resolution, and that the said committee, do prepare and bring in the same."

A true extract from the minutes. Examined by

GILBERT LIVINGSTONE.

11th February, 1789—Albany.

[Endorsed,] Extract from the minutes of the House of Assembly of Virginia, on the petition, &c. of James Rumsey.

An ACT for vesting in JAMES RUMSEY, Esquire, the exclusive right and privilege of making, using and vending divers engines, machines and devices, by him invented, or improved, for a term of years therein mentioned.

Whereas, James Rumsey, of Berkeley county, in Virginia, hath represented to this house, that he hath invented, or improved divers engines, machines,

and devices, hereinafter particularly mentioned, upon principles and constructions not before used, and by actual experiments, hath demonstrated the practicability and utility thereof, and hath in the office of plans of the said several inventions and improvements, with explanations thereof, in order particularly to designate and distinguish them from other engines, machines, and devices heretofore used for purposes somewhat similar. Which engines, machines and devices are called by the following names, and known by the following distinguishing characters, viz:

Rumsey's Pipe Boiler, for the more ample and easy generating of steam by passing a small quantity of water through an incurvated tube, placed in a furnace, whereby the action of fire is communicated to the water and steam in all its passage from the entrance to the exit, and which kind of boiler can be easily adapted to every species of fire or steam engines.

Rumsey's Steamboat, a practical mode of propelling vessels by means of the reaction of a stream of water, forced by the agency of steam through a trunk or cylinder, parallel to the keel, out at the stern.

Rumsey's Improvement upon Savery's Machine, or steam engine, whereby water may be raised in great quantities to any reasonable height, for the turning of mills, or for agricultural or other purposes.

Rumsey's Improvement upon Doctor Barker's Mill, a mode by which millstones and other machinery, requiring a circular or retrograde motion, may be turned by or worked with a smaller quantity of water than by any plan yet exhibited to the public, and entirely free from the difficulties which prevented Doctor Barker's invention from coming into use.

Rumsey's Cylindric Saw Mill, or a mode by which mill saws and all other machinery, requiring an alternately opposite motion, whether perpendicular or horizontal, may be worked without the loss of the weight or force of any part of the water used.

And Whereas, it is highly proper, that ingenious men who by their labors and study contrive and invent improvements in arts and sciences, should be rewarded by the community, in proportion to the advantages resulting from the usefulness of their inventions; and as the most proper mode of ascertaining the utility of any new invention or improvement, must be experience, and as the exclusive right and privilege of making, using and vending to others, such newly invented engines, machines and inventions, is not only the most cheap and frugal, but the most certain way of rewarding inventors according to their several merits,

It is therefore hereby enacted, by the and by the authority of the same, that from and after the passing of this act, the said James Rumsey, his executors, administrators and assigns, shall have the sole and exclusive right, liberty and privilege within the State, of making, using and vending to others, the said *boiler* for generating steam, so as aforesaid described, and called *Rumsey's pipe boiler*; the said *steamboat* to be propelled through the water by means of the reaction of a stream of water forced by steam through a trunk or cylinder from the stern of the boat, against the surrounding water, so as aforesaid described, and called *Rumsey's steamboat*; the said improvement of *Savery's engine*, for raising water for the turning of mills, or for agricultural or other purposes, so as aforesaid described, and called *Rumsey's* improvement upon *Savery's* machine, or *steam engine*; the said mode for turning mill stones, and other machinery requiring a circular or retrograde motion, called *Rumsey's* improvement upon *Doctor Barker's* mill, and the said mode of working saw-mills, and other machines requiring an alternately opposite motion, perpendicular or horizontal, called *Rumsey's saw-mill*; all which engines, machines and devices, are more particularly defined and described in the said plans and explanations so as aforesaid filed of record in the office of and to which definitions and descriptions for farther certainty, this act particularly refers.

And it is hereby further enacted by the authority aforesaid, that no person or persons whomsoever, shall make, use or vend to others to be used, any or either of the inventions or improvements so as aforesaid described or defined in this act, or in the plans or explanations filed of record in the said office, and hereby referred unto; or any engine, machine or device whatsoever, formed or contrived upon the same principles therewith, although the form thereof may be varied, under the penalty of forfeiting to the said James Rumsey, his executors, administrators or assigns, the sum of lawful money of this State; and moreover forfeiting to him and them, all and every such engine, machine and device, so as aforesaid to be contrived, made, used or vended within this State; the said penalty to be recovered by action of debt, founded upon this act, wherein no essoine, protection or wager of law, nor more than one imparlance, shall be allowed, and in the execution to be issued upon any judgment obtained in pursuance of this act, a clause shall be inserted, commanding the sheriff or other proper officer to deliver the said engine, device or machine, to the plaintiff if it can be conveniently removed; but if not, that then and in such a case, the said sheriff, or other proper officer shall cause the same to be prostrated, destroyed and rendered useless, any law to the contrary notwithstanding.

And it is further enacted by the authority aforesaid, that the sole and exclusive right and privilege for making, using and vending the engines, machines and devices aforesaid, by this act granted to the said James Rumsey, his executors, administrators and assigns, shall continue for the term of years from the time of passing this act, and no longer: And that all actions to him or them accrued, or accruing within the said term, shall remain in full force, during and after the expiration of this act.

[Endorsed,]—Act for vesting in James Rumsey, &c., &c.

To the honorable the Legislature of the State of New York, in Senate and Assembly convened.

The petition of John Stevens, Jun'r, of Hoboken, in the State of New Jersey.

That your petitioner has bestowed a great deal of time and thought towards perfecting a machine for propelling a vessel through the water by means of steam. That he has at length brought his invention to that degree of perfection. That as he conceives little or no further improvement can be made on it. That to the best of his knowledge and belief, his scheme is altogether new, or at least does not interfere with the inventions of either of the gentlemen who have applied to your honorable body for an exclusive right of navigating by means of steam.

That your petitioner has made an exact draught of the different parts of his machines, which with an explanation thereof, he is ready to exhibit, provided that after the exhibition thereof, no one be suffered to lay claim to any invention therein described, unless he shall have before exhibited a draught or model thereof to your honorable body; and your petitioner therefore prays that in case his machine should appear to be a new and useful invention, that the honorable the Legislature would be pleased to grant to him an exclusive privi-

lege and right of using the same for the purposes of navigation throughout the State of New York, for such term of years as shall seem meet. And your petitioner shall ever pray.

JOHN STEVENS, Jun'r.

Presented 9th January, 1789.

* The law passed by the Legislature of N. Y. in Mr. Fitch's favor, is entitled "An Act for granting and securing to John Fitch the sole right and advantage of making and employing for a limited time, the steamboat by him lately invented." It is dated 19th March, 1787, and will be found in Greenleaf's Ed. of the laws of the State of New York, 1792, Vol. I, c. LVII. Further information on the subject of early steam navigation can be had by reference to a history of the steamboat case, Trenton, 1815; Colden's life of Fulton, New York, 1817; Duer's letter to Cad: D. Colden, Albany, 1817; Colden's answer to Mr. Duer, Albany, 1818, &c.

MARYLAND.

State Department,
Annapolis, Md., Nov. 26, 1849.

Sir:—

Since the receipt of your communication of the 8th inst., addressed to his excellency the Governor of this state, I have examined with much care the indexes, of all the records of the proceedings of the Governor and Council, and of the Houses of Burgesses from 1642, as also the alphabetted archives of the Legislatures from 1776, to comply with your request.

I have been able to discover nothing with reference to the subject matter of that communication, other than the copies herewith sent.

I am, very respectfully,
Your obedient servant,
JOHN NICK WATKINS,
Secretary of State.

Thomas Ewbank,
Comm'r of Patents, Washington, D. C.

The Petition of James Rumsey of Berkeley County, in the State of Virginia,

Most respectfully sheweth, that your petitioner has been several years employed with unremitted attention, and at a great expense in inventing and bringing to perfection sundry machines and engines; namely, one for propelling boats on the water, by the power of steam, which has been already accomplished in experiments on a boat of about six tons burthen; another machine, constructed on similar principles, for raising water, at a small expense, to be applied to the working of mills of different kinds, as well as to various useful purposes in agriculture; two new invented boilers for generating steam, and also other machines, by means of which, grist and sawmills may be so improved in their construction by a very cheap and simple machine, as to require the application of much less water than is necessary in the common mode.

Your petitioner humbly conceives that advantages of great importance to the agriculture and mercantile interests of the United States, may be derived from the use and employment therein, of the before mentioned engines and machines: but he begs leave to represent to the honorable legislature, that without some encouragement and support from government he will not be enabled to prosecute his discoveries, and to carry his aforesaid inventions and improvements into execution, whereby the public would be deprived of the benefits that might result from them; and your petitioner greatly injured by the sacrifices he has made of his time and property.

Your petitioner deems it unnecessary in this stage of his application to your honorable body, to enter into a detail of the nature and principles of the improvements to which his present petition relates. He therefore takes the liberty of referring to the printed papers herewith presented for further information on the subject, and he flatters himself that on mature consideration your honorable body will be fully satisfied, both of the practicability of his plans and of their importance, as an object of great public utility. Under this impression he respectfully solicits the patronage of the legislature of this state.

Your petitioner therefore prays that the honorable legislature as the guardians and trustees of the public prosperity, will be pleased to enact a law granting as a reward for his before mentioned inventions and improvements, an exclusive right to him, his executors, administrators and assigns, of constructing, navigating and employing for a certain term of years, within this state, the several boats, engines and machines, by him invented and improved.

And your petitioner humbly submits to the judgment of this house, whether in consideration of the great expense he has already incurred in the prosecution of his objects, and the further charges, which must necessarily attend the completion of his plans, the exclusive right prayed for, should not be vested for such a term as might afford him an honorable compensation proportioned to his services.

(Signed) JAMES RUMSEY.

On the back of the foregoing petition is endorsed, to wit:

"Read 11th Nov. 1783, and referred to the next session of Assembly."

An Act to invest James Rumsey with an exclusive privilege and benefit of making and selling new invented boats, on a model by him invented.

Whereas, James Rumsey by his petition to this General Assembly, hath set forth that he hath invented a plan for navigating boats against the current of rapid rivers, at a very small expense, whereby great advantages will redound to the citizens of this state, and has prayed that an act may pass, vesting in him, a sole and exclusive right, privilege and benefit, in constructing, navigating and employing boats constructed after this new invented model, upon the creeks, rivers and bays within this state, be granted to him, his executors, administrators and assigns, for a limited time; and it appearing reasonable that the said James Rumsey should have the benefit and advantage of his said invention:

Be it enacted by the General Assembly of Maryland, That the exclusive right, privilege and benefit of making, constructing, selling within this state, the said new invented boats, or improvements upon the said plan, shall be and is hereby vested in the said James Rumsey, his executors, administrators and assigns, for and during the space of ten years from the end of this session of Assembly.

And be it enacted, That if any person, during the said term of ten years as aforesaid, shall make, construct, vend, sell within this State any such invented boats or vessels, without a license in writing first had and obtained from the said James Rumsey, his executors, administrators, or assigns, for that purpose, or shall purchase or use such invented boat or vessel as aforesaid within the term aforesaid, made by any persons other than the said James Rumsey, his executors, administrators or assigns, or by some person licensed by him or

them for that purpose, every person so making, constructing, vending, selling, or using such invented boat or vessel shall forfeit and pay to the said James Rumsey, his executors, administrators, or assigns, the sum of five hundred pounds, current money, to be recovered in any court of record in an action of debt founded upon this act.

This act of Assembly was passed 22d January, 1785.

To the honorable the Representatives of the freemen of the State of Maryland in General Assembly met:

The petition of Oliver Evans, of the county of Newcastle and State of Delaware, respectfully sheweth: That, during the late war, your petitioner, at a very considerable expense and labor, in various experiments for the purpose of framing a machine (perhaps entirely new) to make wool and cotton card teeth, was at length able to bring his very desirable invention to such perfection as to finish a machine which would feed itself, and completely make one thousand card teeth in one minute; as well as a machine for pricking the holes in the leather with great exactness and dispatch, for the purpose of fixing the card teeth in; and that other persons are now likely to receive equal emolument with himself, by making said machines from his pattern, selling them, and causing them to be used. Your petitioner further showeth that he is altogether convinced that he can erect, for the use of merchant mills, a machine to break the fly-eaten grains in the wheat, to break the lumps of dirt, shell the white caps, and bruise the garlic, so as to render all these things more easily and completely separated by means of the screw and fan; a machine to convey the meal, as fast as ground, from the stones to fall on the upper loft; a machine to attend the bolting hopper with regularity: all or either of which he conceives will very much lessen the labor, and consequently the expense of the milling business. But he, taking into view the expense and labor attending the inventing, contriving, and erecting the above mentioned machines, supposes it would much exceed any private emolument likely to be derived to himself, unless he had some exclusive right to make, vend, and cause to be used, said machines; therefore your petitioner prays your honors to grant him, his heirs and assigns, an exclusive right to make, vend, and cause to be used said mill machine, as well as the machine for making card teeth, that hath the singular property of feeding itself, for the term of twenty-five years, or such time as your honors may think proper. And your petitioner, as in duty bound, will ever pray.

(Signed) OLIVER EVANS.

Upon the said petition was thus endorsed, to wit:

By the Senate, February 16, 1786. Read, and referred to the consideration of the House of Delegates.

By order,

J. DORSEY, *Clerk.*

AN ACT to grant to Oliver Evans for a term of years the sole and exclusive right of making and selling within this State the machines herein described.

Whereas, Oliver Evans, of the county of Newcastle, in the State of Delaware, miller, hath represented to this General Assembly that he hath invented, discovered, and introduced into exercise two machines for the use of mer-

chant mills, one of which, denominated by the said Oliver Evans an elevator, is calculated, by its own motion, to hoist the wheat or grain from the lower floor, and the meal or flour from the stones of any mill to the upper floor or loft of such mill; the other denominated an hopper-boy, so constituted as to spread the meal over the floor of a mill to cool, gather it up again to the bolting hopper, and attend the same regularly, without the assistance of manual labor; also, one other machine denominated a steam carriage, so constructed as to move by the power of steam and the pressure of the atmosphere, for the purpose of conveying burdens without the aid of animal force. And as the said inventions of the said Oliver Evans will greatly tend to simplify and render cheap the manufacture of flour, which is one of the principal staples of this State, as also render the use of land carriages more convenient and less expensive—in order to make adequate compensation to the said Oliver Evans for his ingenuity, trouble, and expense in the said discoveries,

Be it enacted by the General Assembly of Maryland, That, from and after the passing of this act, the said Oliver Evans, his heirs and assigns, shall have the sole and exclusive right of making and selling within this State the said machines above described, agreeably to his new method of constructing and making the same, for and during the full space and term of fourteen years from thence next ensuing, and fully to be completed and ended.

And be it enacted, That if any person or persons shall make, sell or use, or cause to be made, sold or used, within this State any hopper-boy or elevator, upon the plan of the said Oliver Evans, or any steam carriage to be propelled by the power of steam, or the pressure of the atmosphere, constructed as the said hopper-boy, elevator, or steam carriage of the said Oliver Evans are, or in form, similitude, or likeness thereof, during the said term of fourteen years, without the consent of the said Oliver Evans, his certain attorney, heirs or assigns, first had and obtained in writing, he, she or they so offending shall forfeit and pay to the said Oliver Evans, his heirs or assigns, for every such machine so made, sold or used, or caused to be made, sold or used, respectively the sum of one hundred pounds, current money of Maryland, to be recovered with costs of suit, by action of debt, bill, plaint, or information, in any competent court of record in any county of this State, in which the offence shall be committed, wherein no essoin, protection, or wager of law, nor more than one imparlance shall be allowed; provided, always, that if on any action brought for the recovery of the said penalty, it shall be proved that the said Oliver was not the original inventor of the machines for the making, using and selling of which such action shall be brought—that the jury shall find their verdict for the defendant, and such defendant shall recover his costs. Provided that nothing in this act contained shall prevent any future general assembly of this State from abolishing this exclusive right granted to the said Oliver Evans by this act, upon their paying to him, his executors, administrators or assigns, the sum of five thousand pounds current money.

And be it enacted, That if any person or persons who shall be convicted of having made, sold or used, within this State, either of the aforesaid machines, without the consent of the said Oliver Evans, his heirs or assigns, in writing, shall afterwards, without such consent, make, sell or use such machine or machines again, he, she or they so offending, shall forfeit and pay to the said Oliver Evans, his heirs and assigns, the sum of one hundred and

fifty pounds, like money to be recovered in like manner as aforesaid, and so *toties quoties.*

The aforegoing act of assembly was passed 21st May, 1787.

To the honorable the General Assembly of the State of Maryland:

The petition of Robert Lemmon, of Baltimore county, most respectfully sheweth—

That your petitioner, deeply impressed with an idea of the necessity and utility of introducing more effectually the manufactures of wool and cotton into this State, and also of prosecuting the same at the smallest expense which the nature of them will admit, hath with much attention constructed two machines, the one for carding cotton or wool, and the other for spinning the same. That the carding machine with one hand shall turn off more carded cotton or wool in good rolls in one day than thirty hands can do in the usual way, and the spinning machine shall with one hand spin more than twelve in the usual way, in any given time.

That your petitioner has models of the machines ready for the inspection of your honors, and has no doubt they will give satisfaction upon examination.

Your petitioner has in contemplation, (and is confident he could execute it,) a system of machinery to be worked by water, by which one thousand threads might be spun at the same time, with very few attendant hands, which he conceives, if perfected, would be capitally useful to the State, and submits it to your honors as an object worthy the attention of the legislature.

Your petitioner prays your honors may pass a law granting him, his heirs and assigns, an exclusive right to the making and vending the aforesaid carding and spinning machines, within this State, for the term of twenty years, &c.

(Signed,) ROBERT LEMMON.

[Endorsed]—"Read 16th December, 1786."

An act granting Robert Lemmon the exclusive right of making and vending Carding and Spinning Machines.

Whereas, Robert Lemmon, of Baltimore county, by his petition to the General Assembly, hath set forth that he hath constructed two machines, the one for carding, the other for spinning cotton or wool, and praying an exclusive right to making and vending the same; and, whereas, this General Assembly wish to encourage useful inventions, as well as promote the manufacture of cotton and wool within this State—

Be it enacted by the General Assembly of Maryland, That the exclusive right, benefit and privilege of making, constructing and selling within this State, the said machines for carding and spinning cotton and wool, shall be and is hereby vested in the said Robert Lemmon, his heirs, executors, administrators and assigns, for and during the space of fourteen years from the end of this present session of Assembly.

And be it enacted, That if any person or persons, during the said term of fourteen years aforesaid, shall make, construct or sell within this State any such machine for carding cotton or wool, or for spinning them, or either of

them, without a license in writing, first had and obtained from the said Robert Lemmon, his executors, administrators or assigns, or shall purchase such machine or machines, as aforesaid, within the term aforesaid, made by any other person than the said Robert Lemmon, his executors, administrators or assigns, or by some person licensed by him or them for that purpose, such person so making, constructing or vending such machine or machines, or buying the same, or either of them, shall forfeit and pay to the said Robert Lemmon, his executors, administrators or assigns, the sum of fifty pounds current money, to be recovered in any court of record, in an action of debt, founded upon this act; provided always, that if on any action brought for the recovery of the said penalty, it shall be proved that the said Robert Lemmon was not the original inventor of the machine for the making, selling or purchasing of which such action shall be brought, that the jury shall find their verdict for the defendant, and such defendant shall recover his costs.

This act of Assembly was passed 20th January, 1787.

NEW HAMPSHIRE.

Office of Secretary of State,
Concord, N. H. Dec. 1, 1849.

Sir :—Your circular letter of Nov. 8th, requesting copies of any documents on file in this office, relating to patents granted under colonial rule, or by the State previous to conceding that right to the general government, has been referred to this office.

To comply with the request, I have been under the necessity of examining all the acts passed by the province under colonial rule; and also the journals of the council, and council and assembly, (most of which have no indexes.) The result of this examination has satisfied me that no patent was ever granted to any one, for any invention, by the provincial government of New Hampshire.

I inclose copies of acts, passed by the legislature of this State, granting patents to certain individuals. I have not been able except in one instance, although I have made a careful and thorough examination of the files in this office, to find descriptions of the inventions.

The copies forwarded are those of *all* the *patents* ever granted by the government of this State.

I have the honor to be sir, your obedient servant,

THOMAS P. TREADWELL, *Sec'y of State.*

To Hon. Thomas Ewbank,

Commissioner of Patents.

State of New Hampshire. } To the Honorable Senate and House of Representatives, convened at Portsmouth, in said State, the first Wednesday of February, 1786.

The petition of Benjamin Dearborn of Portsmouth aforesaid, printer, humbly sheweth, That as your petitioner has spent much time and money in a variety of inventions, which may be of public utility, he is desirous of enjoying some exclusive benefit from some of them.

Having been the sole inventor of a new constructed printing press, which has many conveniences and advantages, that the common kind has not; having also been the sole inventor of a new constructed balance or scales, which for cheapness and convenience exceeds anything of the kind heretofore used; and having written a collection of rules in arithmetic, in a concise intelligible manner, for the use of schools, entitled The Pupil's Guide; your petitioner presuming that the collected wisdom of the state will not disown inventions formed on the principles of usefulness and economy, but will give countenance and encouragement to the inventor, prays that an exclusive right of making, and selling said press and scales, and of printing and vending said Guide, with any additions and improvements he may make on either of them, may be secured to him and his heirs or assigns for the term of twenty-one years.

As the before mentioned inventions could not be designed and executed

without much laborious study, your petitioner presumes that the reasonableness of this request, will be manifest to your honors. Wherefore he humbly prays for an exclusive right to the privileges aforesaid, and that he may have leave to bring in a bill accordingly.

And your petitioner as in duty bound, will ever pray, &c.

BENJAMIN DEARBORN.

State of New Hampshire,
Office of Secretary of State.

[L. S.] I do hereby certify, That the foregoing is a true copy of the original now on file in this office.

Given under my hand and the seal of the state, this 24th day of November, A. D. 1849. THOMAS P. TREADWELL, *Sec'y of State.*

State of New Hampshire. In the year of our Lord, one thousand, seven hundred and eighty-six.

[L. S.] *An Act investing Benjamin Dearborn with the exclusive right of making and selling certain articles therein specified.*

Whereas, Benjamin Dearborn of Portsmouth, in the county of Rockingham, and state aforesaid, printer, hath petitioned the General Court representing that he had spent much time and money in a variety of inventions, which might be of public utility. That he was desirous of enjoying some exclusive benefit from some of them; having been the sole inventor of a new constructed printing press, which has many conveniences that the common kind has not, and having written a collection of rules in arithmetic in a concise, intelligible manner for the use of schools, entitled, the Pupil's Guide, he prayed that the exclusive right of making and selling any such printing press, and of printing and vending said Pupil's Guide within this state, might be secured to him, his heirs and assigns for a certain time, with any improvements and additions he might make to any of them. The prayer of which petition after due enquiry had, appearing reasonable, therefore,

Be it enacted by the Senate and House of Representatives in General Court convened, That the said Benjamin Dearborn his heirs and assigns, be and hereby are entitled to the sole and exclusive right of making and selling any such printing presses, and of printing and vending of said Pupil's Guide, with any improvements or additions he may make to the same or any of them, for the term of fourteen years from the passing of this act. And if any person or persons but the said Benjamin Dearborn, his heirs or assigns, shall within the term aforesaid, make, sell or print any such printing press, or Pupil's Guide, without his or their permit therefor, such person or persons shall forfeit and pay to the said Benjamin Dearborn his heirs and assigns, double the value of the press, or Pupil's Guide, so made, sold or printed, for every such offence, to be recovered in any court of law proper to try the same.

State of New Hampshire. In the House of Representatives, June 14th, 1786.

The foregoing bill having been read a third time, voted that it pass to be enacted. Sent up for concurrence.

JOHN LANGDON, *Speaker.*

In Senate June 14th, 1786. This bill having been read a third time, voted that the same be enacted.

JOHN SULLIVAN, *President.*

State of New Hampshire,
Office of Secretary of State.

[L. S.] I do hereby certify, That the foregoing is a true copy of the original now in this office.

Given under my hand and the seal of the state, this 24th day of November, A. D. 1849. THOS. P. TREADWELL, *Sec'y of State.*

State of New Hampshire. In the year of our Lord one thousand seven hundred and eighty-seven.

[L. S.] *An Act to vest in Benjamin Dearborn the exclusive right of making and vending certain engines and scales for fourteen years.*

Whereas, Benjamin Dearborn of Portsmouth, in the county of Rockingham, and State of New Hampshire, printer, hath petitioned the General Court setting forth, That he hath at much expense of time and money, invented and constructed a hand engine for throwing water, and that he hath also made and constructed a balance or scales on a new plan, wherefore he prayed that a patent right be granted to him, his heirs and assigns, for the exclusive right of making and vending said engines and scales, with any improvements he might make thereon. The prayer of said petition after a full hearing appeared reasonable; and it being for the interest of the state to encourage the inventing and constructing of new, more convenient and less expensive instruments for the different purposes of life:

Be it enacted by the Senate and House of Representatives in General Court convened, That the said Benjamin Dearborn, his heirs and assigns, be and hereby are vested with the exclusive right of making and vending scales, upon the construction by him, made and shewn to the court; and of making and vending his new constructed hand engine for throwing water, and other engines upon the same principles, with one or more barrels, and with or without condensed air or suction, with any improvements which he may make upon said scales, or engines, for the term of fourteen years, from and after the passing of this act. That the scales shall not exceed in price the sum of eight pounds, nor the hand engine with one barrel, the sum of six pounds in gold or silver, or equivalent in other articles.

And the more effectually to secure to the said Dearborn the right thus vested, no scales of the like construction, nor engine of any size, with one or more barrels upon the same principles with that shewn to the court, shall be used in this state for the term aforesaid, without a seal or stamp affixed or imprinted by the said Dearborn, his heirs or assigns on the same under the penalty and forfeiture of ten pounds

And if any person or persons shall counterfeit the said seal or stamp, or affix or imprint a counterfeit on said scales or engines, he or they shall forfeit and pay the sum of twenty pounds, and all and every other person but the said Benjamin Dearborn, his heirs and assigns, is hereby prohibited from making or vending within this State, for the term aforesaid, any part or parts of scales upon similar construction, and of engines upon the same principles with those before mentioned, under the same penalty or forfeiture; and whereas by an act of this State, passed in June, 1786, the exclusive right of making and vending new constructed printing presses was granted to the said Dearborn, his heirs and assigns, for the term of twenty-one years; the more effectually to carry the intent of said act into execution, be it enacted by the authority aforesaid, that the said new constructed printing presses which shall

be made after the passing of this act, within the time specified in the act passed as aforesaid, shall have a seal or stamp affixed or imprinted by the said Dearborn, his heirs or assigns, on the same; and if any person shall make use of said new constructed printing presses without seal or stamp as aforesaid, or shall counterfeit said seal or stamp within said term, he shall forfeit and pay the sum of ten pounds. The said forfeitures and penalties to be recovered by action of debt, in any court proper to try the same, by the said Dearborn, his heirs or assigns, to his or their use respectively.

And be it further enacted, That the said Dearborn, within one month from the passing this act, shall lodge in the secretary's office a model of each of the machines aforesaid, or a draught of each of them, with a full description of them, and the principles upon which they are constructed.

State of NEW HAMPSHIRE. } In the House of Representatives, January 12th, 1787.

The foregoing bill having been read a third time, voted that it pass to be enacted; sent up for concurrence.

JOHN SPARHAWK, *Speaker, P. T.*

In Senate, January 12th. This bill having been read a third time, voted that the same be enacted.

JOHN SULLIVAN, *President.*

State of NEW HAMPSHIRE, Office of Secretary of State. }

[L. S.] I do hereby certify, that the foregoing is a true copy of the original now in this office.

Given under my hand and the seal of the State, this 30th day of November, 1849. THOS. P. TREADWELL, *Sec'y of State.*

State of NEW HAMPSHIRE. } In the year of our Lord one thousand, seven hundred and eighty-eight.

An Act to grant to Oliver Evans for a term of years, the exclusive right of making and selling within this State, the machines herein described.

[L. S.] *Whereas*, Oliver Evans, of New Castle county, in the State of Delaware, miller, hath represented to this court that he hath invented, discovered and introduced into exercise, two machines for the use of flour mills, one of which denominated by the said Oliver Evans an elevator, is calculated by its own motion to hoist the wheat or grain from the lower floor, and the meal or flour from the stones of any mill, to the upper loft of such mill. The other, denominated an hopper-boy, so constructed as to spread the meal over the floor of a mill to cool, gather it up again to the bolting hopper, and attend the same regularly without the assistance of manual labor.

Also one other machine denominated by said Oliver Evans a steam carriage, so constructed as to be propelled or moved by the power of steam, and the pressure of the atmosphere, for the purpose of conveying burthens without the aid of animal force.

And as the said inventions of the said Oliver Evans will greatly tend to simplify and render cheap the manufacture of flour, as well as greatly lessen the expense of land carriage, in order to make compensation to the said Oliver Evans for his ingenuity, trouble and expense in the said discoveries:—

Be it enacted by the Senate and House of Representatives, in General Court convened, That from and after the passing of this act, the said Oliver Evans, his heirs and assigns, shall have the sole and exclusive right of making and selling within this State, all the three machines above described, agreeable to his new method of constructing and making the same, for and during the full space and term of fourteen years next ensuing, fully to be completed and ended.

And be it further enacted by the authority aforesaid, That if any person or persons shall make, sell or use, or cause to be made, sold or used, within this State, any elevator, hopper-boy, or any steam carriage to be propelled by the power of steam or the pressure of the atmosphere, upon the plan of said Oliver Evans, and constructed as the said elevator, hopper-boy or steam carriage of the said Oliver Evans are, or in form, similitude or likeness thereof, during the said term of fourteen years, without the consent of the said Oliver Evans, his certain attorney, heirs or assigns, first had and obtained in writing, he, she or they so offending, shall forfeit and pay to the said Oliver Evans, his heirs or assigns, for every such machine so made, sold or used, or caused to be made, sold or used, respectively the sum of one hundred pounds, lawful money of New Hampshire, to be recovered with costs of suit by action of debt, bill, 'plaint or information in any proper court to try the same:

Provided always, that nothing in this act contained, shall prevent any future General Court of this State from abolishing the exclusive right granted to the said Oliver Evans by this act, upon their paying to him, the said Oliver Evans, his executors, administrators or assigns, the sum of two thousand pounds in gold or silver money.

And be it enacted by the authority aforesaid, That if any person who shall be convicted of having made, sold or used within this State, either of the aforesaid machines, without the consent of the said Oliver Evans, his heirs or assigns in writing, shall afterwards without such consent, make, sell or use such machine or machines again, he, she or they so offending shall forfeit and pay to the said Oliver Evans, his heirs and assigns, the sum of one hundred and fifty pounds, like lawful money, to be recovered in manner aforesaid.

Provided nevertheless, that the said Oliver Evans shall within three years from the passing this act, cause some person well instructed in the art of constructing said machines, to reside constantly within this State, from and after said three years, until the expiration of said fourteen years.

In the House of Representatives, January 28th, 1789. The foregoing having been read a third time, voted that it pass to be enacted. Sent up for concurrence. THOMAS BARTLETT, *Speaker.*

In Senate, January 30th, 1789. This bill was read a third time. Voted that the same be *non-concurred.*

J. PEARSON, *Sec'y.*

State of NEW HAMPSHIRE, Office of Secretary of State. }

[L. S.] I do hereby certify, that the foregoing is a true copy of the original now in this office.

Given under my hand and the seal of the State, this 30th day of November, 1849. THOS. P. TREADWELL, *Sec'y of State.*

State of New Hampshire. } In the year of our Lord one thousand seven hundred and eighty-nine.

[L. S.] *An act to grant to Oliver Evans for a term of years the exclusive right of making and selling within this State the machines herein described.*

Whereas, Oliver Evans, of New Castle county, in the State of Delaware, miller, hath represented to this court that he hath invented, discovered, and introduced into exercise two machines for the use of flour mills, one of which, denominated by said Oliver Evans an elevator, is calculated by its own motion to hoist the wheat or grain from the lower floor, and the meal or flour from the stones of any mill to the upper loft of such mill.

The other, denominated an hopper-boy, so constructed as to spread the meal over the floor of a mill to cool, gather it up again to the bolting hopper, and attend it regularly without the assistance of manual labor; and as the said inventions of the said Oliver Evans will greatly tend to simplify and render cheap the manufacture of flour, as well in order to make compensation to the said Oliver Evans for his ingenuity, trouble and expense in the said discoveries—

Be it enacted by the Senate and House of Representatives in General Court convened, That from and after the passing this act, the said Oliver Evans, his heirs and assigns, shall have the sole and exclusive right of making and selling within this State the machines above described, agreeable to his new method of constructing and making the same for and during the full space and term of seven years next ensuing, fully to be completed and ended.

And be it further enacted by the authority aforesaid, That if any person or persons shall make, sell or use, or cause to be made, sold or used, within this State, any elevator or hopper-boy upon the plan of the said Oliver Evans, and constructed as the said elevator or hopper-boy of the said Oliver Evans are, or in form, similitude, or likeness thereof, during the said term of seven years, without the consent of the said Oliver Evans, his certain attorney, heirs or assigns, first had and obtained in writing, he, she or they so offending, shall forfeit and pay to the said Oliver Evans, his heirs or assigns, for every such machine so made, sold or used, or cause to be made, sold or used, respectively the sum of one hundred pounds, lawful money of New Hampshire, to be recovered with costs of suit, in a proper court to try the same.

Provided always, that nothing in this act contained shall prevent any future General Court of this State from abolishing the exclusive right granted to the said Oliver Evans, upon their paying to him, the said Oliver Evans, his executors, administrators or assigns, the sum of two thousand pounds in gold or silver money.

And be it enacted by the authority aforesaid, That if any person who shall be convicted of having made, sold or used within this State, either of the aforesaid machines, without the consent of the said Oliver Evans, his heirs and assigns, in writing, shall afterwards, without such consent, make, sell or use such machine or machines again, he, she or they so offending shall forfeit and pay to the said Oliver Evans, his heirs and assigns, the sum of one hundred and fifty pounds, like lawful money to be recovered in manner aforesaid. Provided, nevertheless, that the said Oliver Evans shall, within one year from the passing this act, cause some person well instructed in the art of constructing said machines to reside constantly within this State, from and after the said one year, until the expiration of said seven years.

In Senate, February 3d, 1789. The foregoing bill having been read a third time, voted that it pass to be enacted—sent down for concurrence.

JOHN PICKERING, *President.*

In the House of Representatives, February 6th, 1789. The foregoing bill having been read a third time, voted that it be enacted.

THOMAS BARTLETT, *Speaker.*

State of New Hampshire, Office of Secretary of State. }

[L. S.] I do hereby certify, that the foregoing is a true copy of the original now in this office.

Given under my hand and the seal of the State, this 30th day of November, 1849.

THOMAS P. TREADWELL, *Secretary of State.*

State of New Hampshire, Portsmouth, December 8th, 1791. }

The following is a description of an invention of John Young, in the art of building and altering chimneys, so as to render them morally certain of carrying smoke in tight rooms, which is humbly submitted to be lodged in the office of the Secretary of State by the author.

Let a tube be prepared of plated iron, tin, lead, or logs bored like a pump, or strips of boards will do—let the tube be three inches diameter at one end, or more, for a large smoke, and half that diameter at the other end—place said tube, for convenience, under the floors of the house, in any story thereof—let the largest end of said tube be placed at the outside of the house, so as to receive the air from abroad—let the other end be placed at the bottom of one of the jambs leading up through said jamb to the top thereof, a small distance within the mantel-piece, where the tube is to be let into the smoke of the chimney about six inches, pointing upwards—or the tube may be brought up the outside of any jamb, either in old or new chimneys, where it is convenient, and let through the jamb into the smoke of the chimney as aforesaid—and when it is most convenient one large tube may be fixed into any part of a house, so as that the end at the outside be at least as low as the other end, with small tubes leading therefrom to each or any fire-place in a chimney.

JOHN YOUNG.

State of New Hampshire, Rockingham, ss.

At Portsmouth, on the 8th day of December, 1791, the said John Young personally made oath that he is the original author and inventor of the within discovery and invention by him subscribed—and that he never knew or heard of any chimney or smoke of a chimney built or altered upon said plan before he had invented and improved thereupon.

Before, JOHN CALFE, *Just. Peace.*

State of New Hampshire, Office of Secretary of State. }

[L. S.] I do hereby certify, that the foregoing is a true copy of the original now in this office.

Given under my hand and the seal of the State this 30th day of November, 1849.

THOMAS P. TREADWELL, *Secretary of State.*

State of NEW HAMPSHIRE, [L. S.] } In the year of our Lord one thousand seven hundred and ninety-one.

AN ACT to vest in John Young, his heirs and assigns, the sole and exclusive privilege of building chimneys and altering those already built, agreeably to a discovery and invention of the said Young, according to the description of said discovery and invention lodged in the office of the Secretary of said State.

Whereas, John Young, of a place called Concord, in the county of Grafton, in the State aforesaid, esqr., hath petitioned the General Court, representing that he has discovered and invented the art of building chimneys and altering those already built, in such manner as will render them morally certain of carrying smoke in tight rooms, by which means a vast saving of fuel may be made, and many other advantages received, in case the said invention should be published; wherefore he prayed the General Court would grant him, his heirs or assigns, the sole and exclusive privilege of building and altering chimneys within this State agreeably to said plan, for such term of time as might appear reasonable; upon which petition a committee from both branches of the legislature, after examining the description of said invention, and finding that the said Young is the author and inventor thereof, and that it will probably be of great utility to the public, reported that the said Young, his heirs and assigns, have the exclusive privilege for fourteen years. Therefore,

Be it enacted by the Senate and House of Representatives in General Court convened, That there be, and hereby is, granted to the said Young, as inventor of said art, his heirs and assigns, for the term of fourteen years from and after the passing of this act, the sole and exclusive privilege of building and altering chimneys agreeably to said description of the said discovery and invention lodged in said office; and if any person shall, within this State, build or alter any chimney or chimneys, smoke or smokes of a chimney, upon or according to the said description of the said discovery and invention, or upon any plan which shall appear to have grown out of the said description and invention, the person or persons so offending shall forfeit and pay to the said Young, his heirs and assigns, for each offence, the sum of thirty shillings, to be sued for and recovered in any court within this State having jurisdiction of the cause, and a copy of the said description and this act shall be received in evidence in any proper action which may be commenced for a breach thereof.

And the said Young, his heirs and assigns, shall not demand of any person, for the art of building or altering any one smoke of a chimney, agreeably to said description, a sum exceeding three shillings; and upon the said sum being tendered by any person to the said Young, his heirs or assigns, he or they shall inform of the said art, and give liberty to build or alter so many chimneys as the money shall be tendered for at said rate.

And be it further enacted, That the said Young shall have at least one agent in each county within this State appointed, public notice of which shall be given within four months from the passing of this act; and in any case when it is convenient for any person or persons to apply to said Young, or some one of the agents so to be appointed as aforesaid, for liberty to build or alter any chimney upon his aforesaid plan, before he or they proceed to build or alter any chimney as aforesaid, in such case any such person or persons so building or altering any chimney as aforesaid, and who shall, within three months afterwards, pay or tender the sum from him or them due, to said Young or any one of his said agents, he or they shall not be considered guilty of any oreach of this act.

And be it further enacted, That in case the said Young shall obtain a patent from the general government of the United States for the exclusive privilege of building and altering chimneys as aforesaid, and said patent shall extend to and operate in this State; on the receipt thereof by the said Young, his heirs or assigns, this act shall be void.

State of NEW HAMPSHIRE, { In the House of Representatives, Dec. 8th, 1791. The foregoing bill, having been read a third time, passed to be enacted.

Sent up for concurrence.

WILLIAM PLUMER, *Speaker*.

In Senate, December 12th, 1791.—This bill having been read a third time, voted that the same be enacted. JOSIAH BARTLETT, *President*.

State of NEW HAMPSHIRE,
Office of Secretary of State.

[L. S.] I do hereby certify, that the foregoing is a true copy of the original now in this office.

Given under my hand and the seal of the State, this 30th day of November, 1849. THOMAS. P TREADWELL,
Secretary of State.

VERMONT.

Secretary of State's Office,
Montpelier, November 23, 1849.

Hon. Thomas Ewbank, *Commissioner of Patents:*

Sir: Senator Upham, a few days ago, handed to me your circular relative to the history of American inventions, with a request that I would reply to it.

I have examined the records of this office, but can find no allusion of any kind to inventions or patents. Our early files and records are quite imperfect, and Mr. Henry Stevens, of Barnet, Vermont, an antiquarian, has been employed by this State for a number of years, in collecting papers connected with our early history.

And I take the liberty of suggesting the propriety of your addressing your circular to him. Mr. Stevens is now in Washington, acting for a short time, as I understand, under a commission from the Secretary of the Treasury.

With high respect, I am, &c.,
FERRAND F. SHERRILL,
Secretary of State of Vermont.

LOUISIANA.

New Orleans, *November 28th*, 1849.

Sir: I am instructed by the Governor, in answer to your letter of the 8th instant, to inform you that there are in the archives of this State no records of patents granted under colonial rule. Your communication will, however, be referred to Mr. De Bow, who has charge of our bureau of statistics, and who will transmit to you all the information he will be able to collect in connection with the objects mentioned in your letter.

Respectfully your obedient servant,
CHARLES GAYARRE,
Secretary of State.

Thomas Ewbank, Esq.,
U. S. Patent Office Commissioner.

KENTUCKY.

Letter from Governor Crittenden.

FRANKFORT, December 2nd, 1849.

SIR: Your printed circular of the 8th of the last month, has been received, and although I can communicate nothing on the subject of your enquiries, I trouble you with this reply, to avoid the appearance of neglect or disregard of the national and laudable objects which you have in view.

The admission of Kentucky into the Union was subsequent to the adoption of the federal constitution, and no patents for discoveries or inventions were ever granted by her, nor do our records or public offices contain any information on the subject.

Very respectfully,

Yours, &c.,

J. J. CRITTENDEN.

THOMAS EWBANK, Esq.,

Commissioner, &c.

PENNSYLVANIA.

NORRISTOWN, December 14th, 1849.

JOHN FREEDLY, Esq.,

DEAR SIR:—The letter from the Patent Office at Washington, addressed to the Governors of the different states, with its accompanying circular, as well as a letter from yourself, were duly received.

Upon looking over the documents and records to which I have access, I only find the following, viz:

"PHILADELPHIA, July 18th, 1717.

"To the Hon. William Keith, Esq., Lieut. Governor of Pennsylvania, and the three lower counties.

"The petition of Thomas Masters humbly sheweth, that at the humble representation of your petitioner's wife, Sybella Masters, his Majesty has been graciously pleased to grant him two several patents under the broad seal; one for the sole cleansing, curing and refining of Indian Corn growing in the plantations, fitter for shipping and transportation, in a manner not before found out or practised. The other for the sole working and weaving in a new method, palmeta, chip and straw for covering hats and bonnets, and other improvements of that ware, for the respective terms of fourteen years, in that part of the Kingdom of Great Britain, dominion of Wales, and town of Berwick upon Tweed, and the several plantations in America, as by the said letters patents (which he now lays before this honorable board) may more fully appear.

"Your petitioner prays leave to record the said patents in the province and territories, and such a favorable recommendation thereof from the board, as may the more effectually answer his Majesty's most gracious intentions to him, and promote and forward such useful inventions and manufactures to the public, which he has at a vast expense set on foot and projected.

"And your petitioner shall ever pray, &c.

"THOMAS MASTERS.

"The board having taken into consideration the said petition, thought fit not only to allow the said Thomas Masters to record the said patents, but also to publish them."

This I copy from the Colonial records.

Yours truly,

J. McNAIR.

GEORGIA.

WASHINGTON, December 5, 1849.

SIR:—I had the honor on yesterday to receive your letter of the 12th ult., and accompanying circular in relation to the desire of the Bureau over which you preside, to collect such interesting facts as may be hidden in the archives of Georgia.

All the facts that can be had will probably be communicated by the Governor of Georgia, who, you say, has been addressed also on the same subject, but with a view to elicit any that might not be in the Department of State, I will address some persons in my state, most likely to be acquainted with such matters. Residing in that part of Georgia, which has been acquired of the Indians at a comparatively recent period in the history of our State, my immediate constituents are in all probability not in possession of anything worthy of being communicated to the Department.

I have the honor to be,
Your obedient servant,
A. F. OWEN.

Hon. THOMAS EWBANK,
Commissioner of Patents,
Washington D. C.

FLORIDA.

SECRETARY'S OFFICE,
TALLAHASSEE, January 4, 1850.

Hon. THOMAS EWBANK,
Commissioner of Patents:

SIR:—Your circular of 8th November ult. to his Excellency the Governor, has been handed to me for reply.

I have to state in answer thereto, that no documents relating to patents, &c., are on file in this office.

Allow me to suggest, that, should you address Circulars to the Officers of the Public Archives, in St. Augustine and Pensacola, you may obtain some information upon the subject.

Respectfully,
C. W. DOWNING,
Secretary of State.

ALABAMA.

EXECUTIVE DEPARTMENT,
MONTGOMERY, Ala., January 8th, 1850.

SIR:—I am in receipt of your printed letter of the 8th November, in which you "request to be furnished with copies of any such documents as may be on file in the State Department" of Alabama, which may aid you in tracing up the history of American inventions. I regret that the Archives of the State furnish no information such as you desire.

I have the honor to be,
With great respect, your obedient servant,
H. W. COLLIER.

Hon. THOMAS EWBANK,
Commissioner of Patents,
Washington City.

MICHIGAN.

LETTER FROM SENATOR FELCH.

WASHINGTON, January 12th, 1850.

SIR,—I took the liberty of sending one of your circulars, relative to early records of inventions, and to the history of inventions anterior to the establishment of our present form of government, to Governor Woodbridge, of Michigan, in hopes that his intimate knowledge of the French inhabitants of the North West Territory might furnish some interesting facts on the subject. Although nothing of the kind has been elicited, I am induced to send you the letter of Mr. W. in reply to my communication. No man has had better opportunities for knowledge on the subject than Governor Woodbridge.

I am, sir, very respectfully your obedient servant,
ALPHEUS FELCH.

Hon. Mr. EWBANK, Com'r of Patents.

SPRINGWELLS, near DETROIT,
December 27th, 1849.

Hon. A. FELCH:

Dear Sir,—I have received your note of the date of the 20th instant, with the Patent Office circular you did me the honor to send to me. I am sorry I cannot contribute to the fund of information which the Commissioner is taking measures to collect. When I first came to Michigan, (during the war of 1812,) the great body of its inhabitants consisted of the descendants of the old French colonists located here, with a sprinkling, more or less marked, of Indian blood. Of those of English parentage, either natives of the country, or long resident in it, and who, under Jay's Treaty, had elected to become American citizens, there were a very few families—and a few more, enterprising Yankees, who had from time to time, and more recently, wormed their way into these far-off and wilderness regions. But, as I have observed, the great body of the people were of Canadian parentage, and the features which characterized them were quite remarkable. A more honest and inoffensive people than they were, could not, I think, have been found upon the face of the globe; they were proverbially docile, friendly and hospitable. Possessing the social temper and national gayety of the French every where, they also retained in a most marked degree the manners and graceful polish of their ancestors. Cut off from all direct intercourse with Europe, from the time of their first establishment here, their associations with their countrymen abroad were principally with and through the army, which comprised, you know, since before the reign of Louis XIV., the best educated and the most polished of the people of France. This gave tone to their manners, habits and character, and which they did not forget, when, by the treaty of 1763,

they became almost entirely isolated. They had no market abroad for the products of the land; they, therefore, were not an agricultural people, properly speaking. It never entered into the policy of the French Government (and this was the great error of that Government) to make them so; and, except to the extent of their dealings in furs and peltries, they exhibited no proclivity for an active commerce. Their taste led them to rove in the boundless wilderness that surrounded them, and alternately to enjoy themselves upon the fruits of the chase at home. Their highest ambition was to *preserve* the remembrance and follow in the habits of *La belle France as La belle France was in the 16th century.* This was their *beau ideal* of social perfection! What would *such* a people have to do with *new inventions* or patented discoveries! The thought of *improving* in the mechanical arts, and especially upon the agricultural implements of their ancestors, never entered their minds. Happy, thrice happy, were those who could *preserve the remembrance of those that were!* You may well say, therefore, my dear sir, that you "have no knowledge of the existence of any patents in your part of the country granted under the French Government, or any record of early inventors" among them.

* * * * * * * * * * * * *

With much respect, your obedient servant,

WILLIAM WOODBRIDGE

VIII.

ON THE PROPULSION OF STEAMERS.

This division (Part I.) of the annual exposé, is assumed to be as suitable a medium for occasional essays on the great mechanical desiderata of the day, as is the section devoted to agriculture, for practical information to farmers. To suggest and stimulate invention, as well as protect it, would seem to come within the legitimate duties of a bureau, especially designed "to promote the progress of science and the useful arts." It is, therefore, proposed to occupy a few sheets in future with communications which may point out new channels of thought and tend to enlarge the area of invention.

The subjoined synopsis of original experiments, recently made by the undersigned, and illustrated by various types of nature's propellers, point out, as has been conceded, elements of marine progression that have hitherto been wholly overlooked by nautical engineers. The facts developed are respectfully submitted to Congress, as elucidations of a subject deserving the special attention of the General Government.

Oceanic steamers are too essential links of the system of cheap and free postage—domestic and international,—to be allowed to pursue undisturbed their present average passages. To this great and growing element of modern civilization, and of universal brotherhood, they have yet much to contribute. The Ferry-boats of Nations, they must make their runs from continent to continent, so as to rival, both in regularity and speed, the lines of land locomotives which they severally serve to connect.

The proposition may be a startling one, that in science, the further men advance, the longer become their strides, and the easier they are taken: yet so it is. Locomotive navigation is in point; but, surprisingly rapid as has been its growth, it is in its veriest infancy. Born in our day, its greatest feats are yet to be performed. By gallantly dashing through the palings which some savans had imprudently reared before them, Oceanic steamers have read the learned a lesson about laying out boundaries for science, and hedging in enclosures for art, which will not soon be forgotten.

It is with artificial, as with natural motive-mechanisms: an intimate relationship exists between the members; reaching to the minutest and remotest. If one be out of order, all feel the effect. A lame leg makes its owner halt; an inflamed finger, toe, or tooth, deranges more or less the whole body:—just so with a steamer, whose instruments of progression are defective in figure, out of place, or disproportionate: she too, limps, though neither the infirmity nor the seat of it may be suspected. Swift and agile she may seem to be, yet much of her power produces no corresponding result in her onward course. Like the injured or distorted wings of a bird, malformation in her paddles is fatal to her healthy and rapid flight.

Acute intellects have, for years, been employed in perfecting marine engines and boilers, but the true figure of propelling blades is a subject that has escaped general attention; sources of retardation were not imagined to be lurking there. The virtue of form in them has not been thought of; in short, while speed is desired above all other qualities, the least attention has been given to the organs upon which it depends. Steamers are now so elaborately improved and enriched, as to elicit and deserve the soubriquet of floating palaces; but their buckets are the same rude affairs as were used in primeval paddle-wheels. In endeavoring to quicken their pace, our efforts have resembled those of trainers of race-horses, who should confine their attentions to the animals' heads and trunks, instead of developing and strengthening the muscles of their limbs.

Experiments on the Paddles of Steamers; their figure, dip, thickness, material, and number, &c., made on the Harlem River, New York, in 1848.

For this purpose, the boat, Fig. 1, was employed. It was 12¼ feet long, and 3¼ feet across the middle. A wrought iron shaft, 1 inch square, with a crank, extended across the gunwales, and turned in bearings bolted to them. Each end of the shaft stretched 14 inches over the side of the boat, which prevented the wheels, that were secured on each extremity, from throwing as much water into the vessel as if they had been nearer; and afforded a better opportunity of observing the action of the blades. A person seated at one end of the boat, readily turned the wheels in either direction, by alternately pushing from and pulling towards him, two upright rods, which moved in joints at the bottom of the boat, and were connected to the cranks by horizontal rods or pitmen.

Fig. 1.

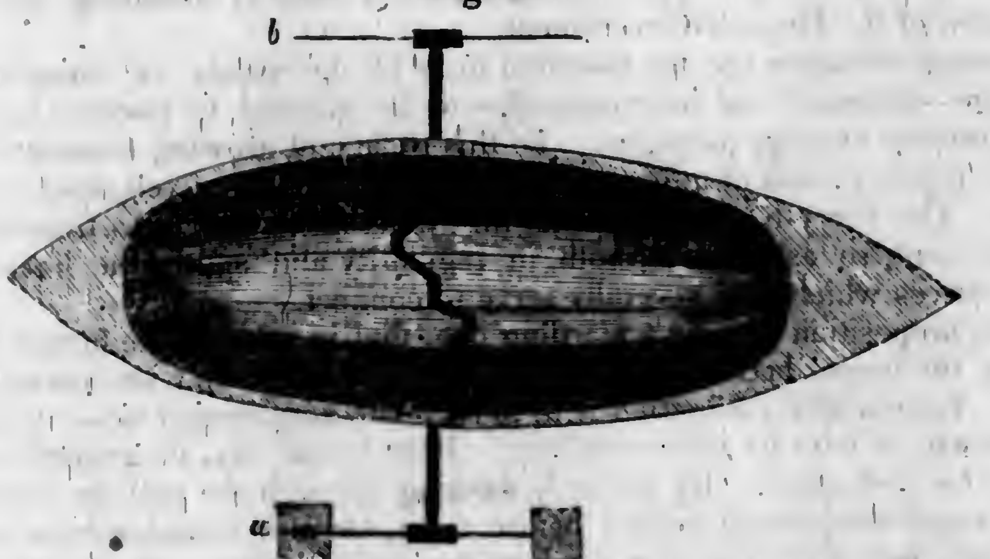
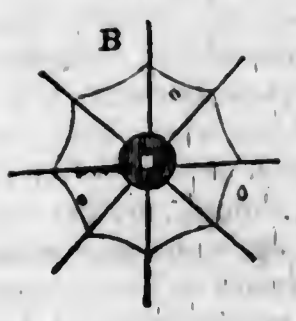


FIG. 2.



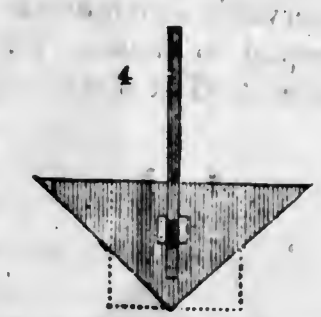
The wheels were very light, and of the simplest construction. One is figured at B. Eight slender arms, of ⅛ square iron, with their inner ends cast in the central piece, extended 20 inches from the centre, and thus made a 40-inch wheel. To stiffen them, and transmit any strain upon one to the whole, they were braced tightly together by the wire, *o*, *o*, *o*, fig. 2, which was wound round each arm, and retained by slight notches at the corners. The various blades or paddles were cut out of stout sheet-iron. Square sockets, to slide over

the arms, were rivetted to the paddles, by which means they were readily adjusted and secured at uniform distances from the axes. All were of the same area—49 inches.

To test the qualities of the boat, and get her into working trim, blades, 7 inches square, fig. 3, were fixed on the arms of both wheels, and several excursions up and down the river made with them. Their dip was 7 inches, or rather more, for their upper edges were half an inch below the surface. They were next removed from one wheel and left on the other, as the standard by which to compare the effects of different shaped ones. They were distinguished as No. 1. Nearly all the rest were formed from them: i. e., by removing portions from one part and adding them to others, as will be seen in the following diagrams. In this way there was no danger of making, through mistake, one set of blades of larger or of less superficial surface than others—since no calculation of their areas was required.

In all the figures, the paddles are supposed to sweep through the water in the position as represented, the lowest sides being those which descend lowest in the fluid.

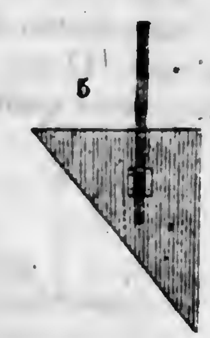
Fig. 4, formed by cutting off the lower angles of fig. 3, and transferring the pieces to the upper ones, making a right-angled triangle with sides 10 inches, and hypotenuse 14. (By mistake the upper corners were cut away, so as to leave the area of these blades 48 square inches instead of 49.) Eight of these were fixed on the wheel, (see *b*, fig. 1,) to compete with the same number of fig. 3, on *a*, both having 7¼ inches dip.



It will be obvious that, as both sets were attached to the same shaft, if one proved more efficient than the other, the boat would be turned from a straight course, and be inclined, more or less abruptly, to the weaker or less efficient set. The result was, that those marked fig. 3 overcame fig. 4, and though only in a small degree, yet quite sufficient to establish their superior effect on the vessel's progress. As we were not always out of the influence of tides and slight breezes, each experiment embraced excursions in various directions on the river. Once or twice the boat went straight as an arrow; but eventually the square paddles got the better of the triangular ones. These dipped into the water with little noise, and threw it off behind from their points.

Most of the experiments were made in smooth water, and except slight currents—aqueous and aerial—under the most favorable circumstances. Two persons occupied the boat, and the greatest care was exercised in preserving the shaft in a horizontal position. When results were doubtful, the experiments were repeated, and generally several times.

The same paddles (fig. 4) were next attached to the arms in the position represented in the margin, and distinguished as fig. 5, the upper side being, as in all other instances, 13 inches from the centre of the axis. Through repeated trials, they overcame the test paddles, fig. 3, and in a rather more marked manner than fig. 3 surpassed fig. 4. They entered the water silently, but observers on shore thought they raised more water behind, but did not raise it as high as fig. 3. Their points were nearly three inches lower in the water than the lower edges of fig. 3. The boat described a circle of four hundred feet, and another of six hundred.



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The same blades were next tried as fig. 6. From the experiment fig. 5, it was inferable that, if inverted, the effect of the blade on the boat would be augmented, as a larger portion would have a longer sweep through the water. Such was the fact, and to such a degree that, first two, and then four, were removed from the arms, when the remaining four were found equal to the eight of fig. 3. The plates were next raised till their lower edges were on a level with those of No. 1. In that position, two inches of their upper extremities were above the surface of the river; but notwithstanding, they had a decided advantage even then over the square ones.

Lastly, the same blades were turned into the position of fig. 7, being fig. 4 reversed. The boat was turned on No. 3 under all circumstances, describing circles from 80 to 150 feet in diameter. Four of them equalled eight of No. 3. They were thought to throw off more water behind than their competitors, which, from the greater extent of their extremities, was probably true.

The next form tried was fig. 3 placed in the position of fig. 8. These turned the boat round against the test ones, in circles varying from 50 to 200 feet. We then tried six of them against the other eight, when there was little observable difference in the result. Four were found superior, but three were unequal to them. These of course entered the water without jarring, and threw it off at their points. Mr. B. thought they threw up more than fig. 3.

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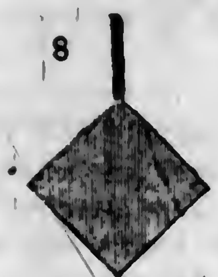

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Fig. 9, formed by removing the upper corners below, as in the figure, seemed to have the advantage of fig. 8; but as light winds troubled us, we felt some hesitation in pronouncing them better. Four were superior to eight of No. 3. It was supposed that a slight accession of resistance to the lower ends, sweeping through the water, might be derived from opposing currents meeting in the forks, but we had no means to ascertain if it existed.

Fig. 10, cut out of plates eight inches square, with one-fourth (minus a superficial inch) removed, as shown in the figure. After several excursions, these were thought to exhibit a very slight advantage over fig. 3; but from subsequent tests, they seemed to be balanced. We, on another day, reversed them, as

Fig. 11, which had a decided preponderance over their competitors. Six predominated slightly over the latter, and four were thought nearly equal to them. There was a difference of opinion on the last point—some thinking they were quite as effective as the opposing eight.

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Fig 12 was a semicircle. Mr. B. undertook to test these. They turned the boat in circles varying (from light winds and tides) from 30 to 150 feet. Four were thought sometimes equal, and sometimes superior, to eight of fig. 3. It is demonstrable that these blades are less effective, though in a very small degree, than those marked fig. 7, and, when reversed, more powerful than fig. 4.

Fig. 13, formed as represented, but not tried, as it was evident their value would be nearly that of fig. 7, probably a shade above them, but too minute to be detected, except in perfectly still water.

Fig. 14, a right-angled triangle, 7 inches across the top, and ending in a point nearly 14 inches below it. These were, as might have been anticipated, more effective than those of fig. 3. "Everything about them," observed Mr. B., "shows their superiority." They, of course, entered the water without jarring.

The same were attached to the arms in the position of fig. 15, and were unable to compete with fig. 3. The latter had a slight advantage over them.

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They were next reversed, as fig. 16, when they proved effective as figs. 7 and 12—four being equally so as the eight opposed to them.

They were finally changed to fig. 17, when the boat was turned so rapidly, as to make it difficult, with a wide oar, to keep her in one direction. Four were removed, and then she described a circle in less than 50 feet. Two more were taken away, leaving only a couple to act against the eight on the other wheel, and to which they proved equal.

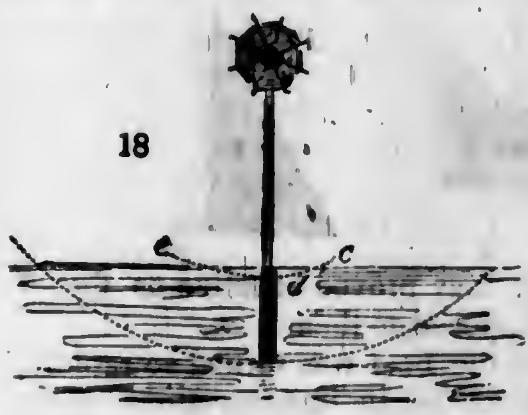
From these experiments, it appears that, with equal *areas*, and equal *dip*, triangular blades may be rendered *twice* as effective as ordinary rectangular ones. This is made manifest by figs. 7, 12, and 16,—*four* of the former equalling eight of the latter. And this, too, while the propelling surface of the smaller number was only half that of the greater; for the four were as long in making a revolution, as were the eight. Hence, the speed of a boat may be increased by diminishing the number of her paddles—a fact still further elucidated by fig. 17.

There can, I think, be little doubt, that the greater the velocity of a steamer's wheels, the fewer (within certain limits) should be the blades; and that, at the rate at which some revolve, the number might be reduced with advantage. Some have three, others four, and in more than one vessel, without any load on board, I have seen six submerged at each wheel. In these cases, is it not evident that each blade, on entering, plunges, not, as it ought, into water undisturbed, but into that which preceding ones have already broken up, and set in motion towards the stern? It would seem that one in the act of plunging, another sweeping under the shaft, and a third leaving the surface, are all that are necessary to be kept up; and that a greater number, as regards the speed of a boat, is positively injurious. Yet, under a vague idea of attaining a higher speed, the number of paddles has frequently been nearly doubled.

Snow, as every person knows, causes the wheels of land locomotives to slip upon, instead of rolling over, the rail. They revolve as usual, but the carriages make little progress; hence much of the power spent on them is expended to no purpose. So it is with paddle-wheels: a boat never progresses in the ratio of their revolutions, because of the yielding medium in which, and against which, they act. They slip always—a result, to some extent, inevitable when massive solids wade through fluids. The distance between the Atlantic steamers' docks, in Liverpool and New York, has been calculated at 3023 miles, but their paddles, in each trip, pass over a space varying from 5000 to 8000 miles* In steamers unaided by sails, the disproportion is often greater. Now can this be modified, by giving the paddles a better hold on the fluid they sweep through? The experiments with blades 5, 6, 7, 8, 9, 11, 12, 14, 16, and 17, furnish replies to the interrogatory.

The moral of the foregoing experiments is this:—As the propelling power of a paddle is greatest at its lower or outer extremity, and diminishes to nothing at the surface, so its face should enlarge with the dip, and be nothing, or next to nothing, above.—Let *d*, fig. 18, represent the end of an ordinary blade, or paddle. Its upper part barely touches the water, and only for the moment it is in the position shown. But suppose it were immersed to the line *e*, *c*,—say four or five inches—it would even then be no sooner under, than above the surface again, so brief would be its immersion. The lower edge, in the meanwhile, would sweep along the extended curve there delineated.

18



Of what use, then, to make the upper part of a blade of equal extent with the lower? Why accumulate surface where it is of little avail, and withhold it where it is most wanted?—expending materials and power without any adequate return, if not at an absolute loss. The quantity of water carried over a wheel, is certainly greater by ordinary, than it would be by triangular paddles. The popular form and position of paddles are unphilosophical, if viewed simply as propellers. Embrace the same area in any other outline—in a circle, ellipse, square, pentagon, hexagon, octagon, or other polygonous figure, and the propelling properties would be increased, and the jar arising from their striking the water, also diminished.

If the long parallelogram be preferred because of the ready application of wooden planks, then is the principal sacrificed to an accessory—the greater to the less. If triangular, or other improved blades, require the adoption of

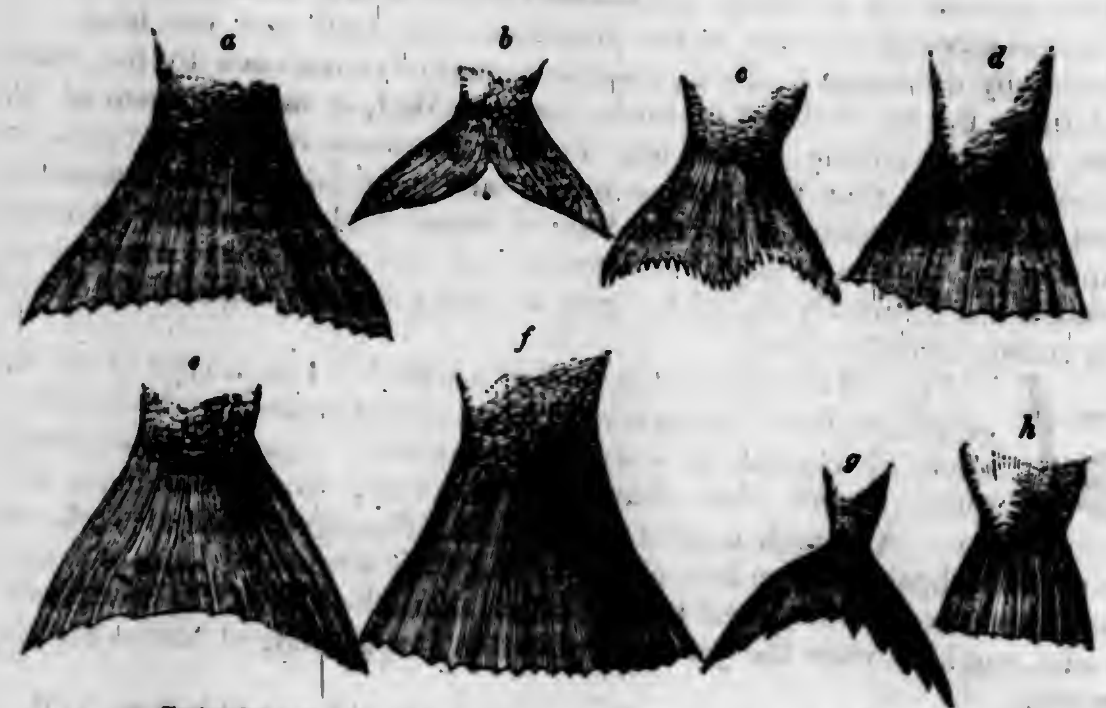
* The English steamer *Europa* came in on the 25th ult., after the remarkably short trip of eleven days. Her wheels are 32 feet in diameter, and taking their revolutions at the average of 17 per minute, her paddles swept over a space exceeding 5000 miles. The steam ship *Northerner* has wheels 31 feet in diameter. In running from New York to Charleston, 630 miles, they made 52,000 revolutions, in another trip, 51,000. The *Cherokee's* wheels are the same dimensions. In her first trip, to Savannah, a distance of 700 miles, they made, 53,000 revolutions. The practice now is, to lessen the slip of marine carriage wheels, and make them approach nearer in effect to those used on land, by increasing their width; that is, the length of their paddles. Hence those of the *Atlantic*, one of the large Liverpool Liners now building, are to be 12½ feet long; but for the difficulty of entering the English docks, they would have been 14 feet. Those of the *Hermann* and *Washington*, of the Bremen Line, are respectively 8 feet and 7½; while the *Franklin*, preparing for the same line, has them 12 feet. The English mail boats of recent build, the *Europa* and her three associates, have paddles between 8 and 9 feet.

plates of metal, would it be wise to reject them on that account? But of this by and by. We shall see that thick wooden blades ought to be condemned on account of defects inherent in them.

But what is this expansion of the lower part of a paddle, and contraction above, but Nature's own plan? In the tails and fins of fishes, in wings of birds and insects, and especially in the palmipeds, she has nowhere sanctioned a rectangular propeller. All are inclined to equilateral, scalenous, or isosceletic triangles, or are made up of them. Nor does she ever unite the levers that work them to their sides. The junction is invariably at an angle, and the reason is apparent—that the largest surface may have the longest sweep.

With this view, the bodies of fishes taper down to meet the blades; retaining only sufficient muscle to work them. Waiting one day for the cars to proceed to Harlem, I stepped into a neighboring Fish Market, and sketched the following, from specimens on one of the stalls. I am ashamed to ac-

19



a, Striped bass,
b, Porgee,
c, Sea bass,
d, Black-fish,
e, Salmon,
f, Cod,
g, Mackerel,
h, Flounder.

knowledge that, till then, I was ignorant of the exact forms of these natural propellers, although most of them had passed under my observation on a thousand occasions. Too many of us spend no more thought on the infinitely curious and instructive mechanisms submitted by the Creator to our inspection daily, than does the ox on the vegetable glories he feeds on. The sentiment applies not more to religious than to physical truths. "Light shineth in darkness, and the darkness comprehendeth it not." We grope, as if blind, for that which is patent before us.

The general outlines and proportions are given in the preceding figures; the dimensions, of course, vary with the age and growth of individuals. The figures denote the width and length of the expanded tails—the latter being taken from the termination of the body, as shown by the curves, which

reach more or less into the tails—i. e. to strengthen them where strength is most required.

I confess I had no idea of meeting with figures so closely allied to the artificial ones which I had found most effectual as propellers. With the exception of the first two, the whole approach to equilateral triangles.

In the absence of a more extended acquaintance with the minuter aqueous and sub-aqueous organisms, the nearest of natural analogues to steam vessels, seem to be the principal swimming birds. These glide through two elements at once. Their long and heavy bodies, adapted to float gracefully on water, are provided with organs of propulsion, placed far behind their common centres of gravity—the cause that makes them such awkward travellers on land. When a gale blows in the direction they wish to pursue, like human navigators, they take advantage of it—they spread their wings to catch it, and are driven onward then, as steamers are, by both wind and paddles.

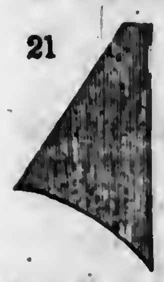
The reciprocating action, and the expanding and collapsing features of their aqueous organs of progression, are supposed to be unsuited to the magnitude, materials and velocity of artificial ones. Perhaps they are—but may not their contour be perfectly applicable—since, when open, and in action, the circumstances of the two bodies propelled—the bird and the boat—are not essentially dissimilar? Now, there is a marked adherence to the triangular form in the webbed feet of birds, showing that, in the judgment of the Creator, such an outline is the best for the purposes of their propulsion. Nor does it appear that this outline has, in any material way, been modified to meet other exigences. In the feet of water-fowl it is almost identical with the tail of the sea-bass. The legs or rods that wield these ornithological paddles are invariably united to them at their points or angles, and clearly for the reason already stated.

20

Fig. 20 represents the foot of a petrel. It is a type of all the swimming birds' propellers. Few, except professional naturalists, could distinguish between it and the same organ in geese, ducks, gulls, swans, the albatross, cormorant, diver, flamingo, &c., &c. Although natural paddles are submerged when at work, and those of our wheels emerge into air, to repeat their strokes, I doubt if a more efficient form could be given to the latter than the above. The cuspated extremity would obviate the jar consequent on straight-edged blades striking the water.

If I had a new boat to fit propellers to, they should resemble figs. 7, 6, or 17; or I would rather make them like half the foot of a swimming bird, as fig. 21—the perpendicular sides being next the vessel, that the greatest strain might be nearest to the power. Such blades would not be raised out of the sea by a vessel's rolling—nor, when submerged, be subject to excessive strainings, as common ones are. They would produce no concussion, or but little, on dipping, and would be twice as effective as the same area employed in the prevailing form and fashion.

21



If the principle were required to be adopted in the present paddles, it could be done at a trifling cost. I would remove portions from the upper sides, and attach them below, somewhat after the manner shown at figs. 22, 23, 24 and 25.

22

23

24

25

The portions *might* be removed by curved instead of straight lines.

If I should use blades similar to fig. 7, I would vandyke their lower edges, as at 23, point them as at 25, or fork them as at 22.

The foregoing experiments and remarks relate chiefly to the *figure* and *dip* of paddles. Other traits next solicited investigation; and though neither prominent nor promising any adequate reward for the requisite labor, they were thought worth attending to, since engineers will certainly be urged shortly to cast about for every means of adding, though ever so little, to the speed of steamers.

BUOYANT OR DISPLACING PADDLES.

It had been imagined, that the resistance which fluids oppose to the sinking of bulky bodies in them, might be employed as an element of propulsion—that if close barrels, for example, were fastened to the arms of a wheel, their ends would act as paddles, and the force required to plunge them, (equal to 62 pounds for each cubic foot of water displaced,) also react favorably on the boat. To test this idea, eight square and tight boxes, fig. 26, 7 inches by 7, and six inches deep, were secured to the arms of one wheel, and set to work against the eight blades, No. 1, (fig. 3,) on the other. The boxes required, very sensibly, more power to carry them round than any other tried, and were miserably deficient in pushing the vessel forward with it—certainly not equalling four of the competing blades. They produced quite a commotion in the water, carried large quantities over with them, and, could we have communicated sufficient velocity, would probably have formed a vertical ring of water. These boxes were and should be considered simply as unusually *thick* blades. All paddles are buoyant in proportion to their thickness.

Fig. 26.

THICKNESS OF PADDLES.

But though worthless in one respect, they were valuable in another, for they led us to the fact, or the law, that the propelling virtue of blades expands and contracts with their thickness. Thicken them till they touch each other, and they form a perfect drum, which could exert no more propelling power than a revolving grindstone;—reduce them to the thinnest plates, consistent with the strains they have to oppose, and in the same ratio their propulsive quality is augmented.

The boxes were removed, and boards $\frac{3}{4}$ths of an inch thick, and 7 inches square, put in their places. These represented common plank paddles, and were found sensibly inferior to their metalline competitors, whose thickness was slightly less than $\frac{1}{16}$ inch. We next took away two of the latter, when no very obvious change in the boat's direction occurred. When two more were taken off, the remaining four were unable to contend with the wooden ones. These, it will be remembered, were $\frac{1}{8}$th the thickness of the boxes, and consequently inherited that proportion of their defects.

It was also very observable how much more water was raised by the boards than by the plates. It could not easily be cast off their blunt boundaries, but kept running over them, from one side to another—a fact rendered more distinct in the boxes. Nothing could declare plainer, that the sharper the dipping edges of paddles are made, the more back water they throw off at the point where its departure is most beneficial: that is, when the re-action favors the vessel's progress—and, consequently, less is carried higher than the axis. A very little labor would impart this feature—in other words, would make their section a wedge. The resulting benefit would repay the expenditure a hundred fold.

Compared to metal, wood approaches in its nature to sponge; water clings to it; its pores are absorbing vessels, that suck it in, and assist to retain it on the surface.

Here nature also confirms the positions arrived at. Extreme tenuity of blade is stamped with perfection by her. Hence we see it strengthened by reticulated bars in the wings of insects—by radial, angular, and tapering ribs in the fins and tails of fishes. An uniformly thick, and unsupported slab, like our paddles, is nowhere met with. We cannot imagine natatory or soaring organs, formed after such a pattern, without feeling the absurdity.

The caudal propellers of fishes are necessarily thick where they join the bodies, but how rapidly is the substance diminished, and to a mere film, at their extremities, so much so, that they are often there torn and jagged, by accident or wear, as fishermen well know. There must, therefore, be some powerful reason for withholding the material—one that overbalances all inconveniences resulting from its absence; and what can it be but the thinner the blade, the more efficient as a propeller it is—the longer is its stroke, and the more effectual is the power that wields it. The same law prevails in the wings of birds; their outward boundaries are feathered off to almost nothing.

The reflection is irresistible. With what nicety and care Nature perfects her propellers, and how clumsy and unfinished are ours; as if, forsooth, a vessel's progress did not depend upon them.

The last two experiments demonstrate, that the less water a paddle *displaces* by its volume, the more efficient it is; that all accumulation of material behind its acting face, beyond what is absolutely necessary to strengthen it, is injurious, and ought to be avoided. But how does this accord with the current practice? Oaken planks are universally employed, and I have heard more than one engineer assert, that the thicker they are, the better! Because, said they, if the propelling property be not enhanced, it is not diminished, and the additional weight is a positive advantage, since the heavier the wheels are, the easier they work—the more uniform their movements.*

* As a further indication that the value of thinness in blades, and of their disencumbrance from every pound of material extraneous to their functions as propellers, has not hitherto been appreciated, it may be remarked, that the same language was repeated in my hearing, thus:—

The "Gorgon," an English steamer, had "large wheels and little power," so she used oak or pine scantlings, 5 inches by 6, or 6 by 8, for paddles. Had her managers been aware of the true effect of thick blades, they never would have adopted them with the view of economizing power.

Paddle planks vary in thickness from $1\frac{1}{4}$ to 3 inches. No sea steamers have them less than 2 inches. In the English vessels they are $2\frac{1}{4}$; in others, as the *Franklin*, they are $2\frac{1}{2}$; in some of the largest class they are 3. The *Atlantic* and the *Pacific*, each of 3000 tons, now building for the Collins' Line, are to have them 3 inches. The former is to have 28 blades; hence, united, they will form a solid mass, *seven feet* thick, in each wheel—just one fifth of its diameter! They are to be $12\frac{1}{2}$ feet long, by 34 inches; those of both wheels will, therefore, contain nearly 500 cubic feet of timber, and must displace that enormous volume of water at every revolution, by their submersion alone!—and, as we have seen, not only uselessly, but with a serious retardation of the vessel's headway, and waste of her motive power.

The wheels of the *Pacific* are to be 36 feet in diameter; each will have 30 blades, $11\frac{1}{2}$ feet by 3 feet; the solid contents of her paddles will, therefore, equal 517 cubic feet. Her loss from the same source will, therefore, be greater. In *every* revolution of each of her wheels, her paddles will lose $7\frac{1}{2}$ feet of effective stroke, and those of the *Atlantic* 7 feet. Those of the ocean steamer *United States* are $2\frac{1}{4}$ or $2\frac{1}{2}$ inches thick; they are 36 in number, but as they are "split," and attached on both sides of the arms, there are really 72. The effective stroke of her blades is certainly diminished from 10 to 15 feet, in every turn of each of her wheels, startling as the assertion is.

Has the attention of engineers ever been turned this way? Or have they forgotten that a volume of water equal to that of a boat's paddles, and every inch of material submerged with them, is neutralized as a resisting medium, as often as it is displaced by their immersion—that water is to them what steam is to pistons—the more space the latter occupy in cylinders, the shorter becomes their stroke, because metal then takes the place of steam; the object to be moved crowds out the mover. Thicken a piston till it fills its cylinder, and the motive agent being wholly kept out, all motion ceases.

It is much the same with the paddles of a wheel. Let them fill up $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$ or $\frac{1}{2}$, of the circle they describe, and in those proportions they lose their virtue, because in the same proportion they displace or push aside the fluid agent on which their worth depends.

The *Atlantic* will lose *seven feet* stroke in every turn of her wheels. I leave to mathematicians to determine how many more miles an hour she would make if the loss were reduced to seven inches, by using $\frac{1}{4}$ inch iron in place of 3 inch plank.

The paddles of United States large steamers are invariably of 3 inch plank. The language of the chief engineer on this point, under date of January, 1849, was as follows: "The blades of large wheels for marine steamers are usually, and ought to be, three inches thick." The average number in each wheel, he observed, is twenty-eight. Hence, it is demonstrable that nearly twelve per cent. of the power employed in these vessels is thrown away, and

"A few tons of wood in the buckets do no harm, if they do no good; they add weight to the wheel, which is desirable, and their only disadvantage is, the additional load on the boat." I believe this is the general, if not the universal, opinion of engineers. But the experiments just referred to, teach us that, if a wheel require loading, the load should be attached to those parts of the arms that revolve above the surface. They cannot enter the water without becoming drags on the blades.

with it even a larger proportion of their enormous cost and attendance when in active service.

There are several interesting questions about paddles that yet require solutions, but as respects their thickness, there is no *mean* to seek; the thinnest is the best under all circumstances—thin, were it possible, as a lamina of mica. The only question is, what material will supply the thinnest sheets to resist the pressure they are to oppose? Plates of steel may yet be adopted, and perhaps coated by the electrotype process with copper or other metal.

To one remark, an examination of some steamers' wheels adds force. The accumulation of bolts, nuts, clamps, straps, stays, and other things, on and about the backs and faces of the paddles—sometimes even to bolting a new plank, or part of one, over an old one—shows that those who heap on matters of the kind, are not aware how much the efficacy of blades is thereby diminished. They forget that they should be thin and smooth as plates of glass, and that every inch of matter introduced between them is an evil. It is impossible to view the disjointed, broken, patched up slabs of some vessels, without exclaiming, "What a saving of power, and increase of useful effect, would not the substitution of a suitable sheet of metal for each accomplish!"

In some vessels—the United States mail steamer *Galveston* is one—strips of plank are bolted over the ends of the paddles to prevent their splitting or warping. As they do not diminish the faces, but merely form elevations upon them, they are doubtless considered as in no degree interfering with the propelling function. We now perceive that, when such things are necessary, they should be of iron, and let into the blades, so as to be flush with their surfaces.

A new division of engineering might judiciously be made, and paddle making be recognized as a distinct department. These instruments have certainly never received the attention which they merit. Speed is the great desideratum, and it depends on them. Engines, and all the mechanism of a steamer, are subservient to them; and yet, while everything else has been elaborated to the utmost, they have been all but overlooked.

NUMBER OF PADDLES.

The experiments of each day evinced that, so far as propulsion is concerned, the fewer the paddles the faster went the boat, so long as *one* at each wheel, or an area equal to the face of one, was kept in full play. A greater number in the water merely cuts it into slices, throws them into commotion, and diminishes the resistance they should oppose to the blades. As a further elucidation of this fact, four blades, 7 × 14, were tried against the eight test ones, 7 × 7. The smaller number had a decided advantage over the greater, and the cause was visible—they had a full sweep through an unbroken, undisturbed mass of fluid, and consequently produced, unabridged, their legitimate effects; while those on the other wheel—unusually small (½ or ⅓) as their number was, compared to those on the wheels of steamers—following so quickly in the wake of one another, threw it into an uproar, causing eddies, whirlpools, and counter currents, and thus interfering with each other, necessarily produced inferior results.

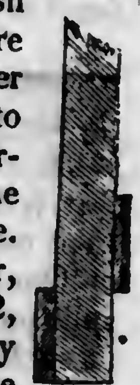
We thought 8 of fig. 4 would be equally valuable as 24 of fig. 3, but the

construction of our wheels prevented us from instituting a series of similar comparisons.

The number of paddles now employed is, generally, greater than formerly. For large vessels, 28 are usual; some have 24, and others 32. The English rule, said to be a good one, is adhered to by many American engineers, except when circumstances require a deviation. By it, there is a paddle for every foot of a wheel's diameter, which makes them stand three feet apart; there are boats in which they occur every two feet.

One object of their multiplication, is to equalize the jar of their striking the water, by increasing the number of the blows. With the same view, they are often divided through the middle, lengthwise, and the inner half—that next the shaft—removed to the opposite side of the arm, as in the end view, fig. 27, thus *doubling*, in a manner, their number. All the British steamers have their blades thus arranged. The *Hermann's* 28 were thus made into 56; their efficacy was found to be reduced about 9 per cent. The value of the upper or inner halves has been ascertained to amount to about the same, for, when wholly removed, the lower portions have proved within 10 per cent. as effective as before. The blades of the *United States* are split, and disposed as in the figure. The true principle of breaking the jar of paddles striking the water, seems to me to be indicated in the blades 4, 5, 8, 9, 10, 14, 15, 21, 22, 23, 24, 25. Had the attention of engineers been led to it in the early days of steaming, the popular plan of avoiding the evil at the expense of a greater, would not have been sanctioned so long.

27.



I observed the blades of the last named steamer, a week after her recent return from Europe. *Seven* were submerged, or *fourteen*, if those on both sides of the arms be counted. She sailed on the 4th inst., for New Orleans, with eight (or sixteen) under water. The *Cherokee* left on the 1st for Savannah, with *six* of her undivided blades below the surface. The *Washington* came in on the 6th inst., from Bremen, with *five* similar ones fully immersed on each side—four full ones, and the halves of two others. The largest of our Sound and River boats have equal, if not greater numbers under. The *Vanderbilt*, 1200 tons, has *five*, or *ten* halves, immersed in each wheel, when lying at her dock, and without passengers on board. The *Isaac Newton*, 1200 tons, has similar wheels, and the same number of blades under water at once.

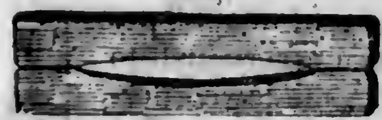
It is clearly as impossible for a paddle to do its duty, when thus embarrassed among its fellows, as for a traveller to make the same progress through a crowd, as on an open plain.

It may be a matter of future interest to place on record this feature, as exemplified in other New York steamers. The following memoranda are from personal observations, made within the last twelve months.

The *Hudson* has three undivided paddles under at each wheel.			
" *Utica* three	do.	do.	do.
" *Red Jacket* four	do.	do.	do.
" *Cleopatra* four	do.	do.	do.
" *Ansonia* nearly four	do.	do.	do.
" *Falcon*, U. S. mail, has five fully down.			
" *Galveston*, U. S. mail,	do.	do.	
" *Confidence* four and a half		do.	
" *Oswego* four		do.	

The *Koskiusko* three and a half—her arms heavy timber.
" *Erie* four do. do.
" *Armenia* four fully down—out of sight.
" *Antelope* three and a half do. do.
" *William Young* three do. do.
" *Buena Vista* two and a half do. do.
" *Admiral* nearly four do. do.
" *Warren* the same do. do.
" *New Haven* five do. do.
" *Hero* three do. do.
" *Massachussetts*, (1000 tons,) plying on the Sound—five.
" *Alida* three and a half. She is deemed a first class boat, and a quick goer. Her wheels are 31½ feet diameter. The blades, 2 inch plank, ten feet long by 33 inches; each consists of two planks 16½ inches wide—hence a joint in the middle. A curious example of the mechanical effect of the blades striking the water is exhibited; a long elliptical portion being worn away in several, as in the figure. Probably imperfect joints admitted the water through them at first, and continued rushing kept enlarging the apertures.

28.



The *Bay State* (1600 tons, plies on the Sound) has the same number of split and divided blades as the Newton and Vanderbilt, that is, ten immersed at each weel.

The *South America* has eight immersed at each wheel.
" *Buffalo* nine do. do
" *Empire State* eight—her arms and rings are heavy timber.
" *Oregon* ten—same as the Bay State.
" *Empire*, of Troy, eight—fully down.

As regards the violent concussion arising from the action of existing paddles, to diminish which their number is increased—to lessen by division the blows—there is a simple mode of reducing it *one half*, though from their unphilosophical and unmechanical figure, it cannot be wholly removed, nor the consequent loss of power avoided. The usual practice is, so to arrange a boat's wheels that two blades, one on each side, strike the water simultaneously. In calm weather who has not heard these double blows at the distance of several miles?—this custom is the converse of Nature's. No swimming or diving bird pushes out both paddles at once—they invariably *alternate* them; an imposing and instructive fact. Had any of the palmipeds, those especially that live entirely in water, hunting their prey beneath it, and consequently to whom velocity is indispensable to existence, struck out both paddles at once, the plan of nautical engineers might have been deemed in accordance with correct principles of speed, and economy of material and power; but while they all use but one at a time, it is surely worth while to test by experiments the difference between the two actions.

29

As sea steamers have little occasion to go sternforward, the backs of the acting faces are occasionally dressed off, as shown by the outline of fig. 29. As far as the lower or dipping parts are concerned, this is a small, a minute advantage; but from the preceding experiments, it is seen how beneficially such blades would act were those parts brought to a knife-edge, and their sections bounded by the dark part of the cut. Their sides might be made slightly concave, as oars generally are. Such might be made also of metal, by uniting two curved plates at the

lower edges, and letting them diverge upwards; braces, if necessary, might be introduced between them. Each plate would, however, be a brace to the other.

ARMS OF WHEELS.

The practice of making the arms of paddle-wheels of uniform or nearly uniform dimensions throughout is quite wrong. They may, without diminution of strength, be reduced towards their extremities, and ought to be, since every inch of surplus material submerged in them detracts from the work done by the blades. They should taper outwards, as nature tapers the radial ribs in her propellers; but instead of this, the arms of wooden wheels (and there are few as yet of others) are constructed *directly the reverse*. Their dimensions are *increased* outwards; and so general is this practice that it may be considered universal. The Erie, belonging to the New York and Erie Railroad Company, will serve as a fair example. An iron boat, she has wooden wheels 28 feet 8 inches in diameter, with 28 paddles on each, 8 feet 8 inches long, 26 inches deep, and about two inches thick. The arms are oak scantling, 7 inches by 3 where they join the shaft, and 10 by 3 at their other extremities! As there are three to each paddle, one at each end, and one in the middle, the number to each wheel is 84, full one-half of the timber immersed being not only useless, but highly injurious to the vessel's speed. This is not all: a further drag on her is to be found in the rims or large circular stays to which the outer ends of the arms are secured; they are made of timber 5 inches by 5, and as portions are immersed with every paddle, a still larger volume of fluid is displaced. In this boat *four* paddles or buckets are under water at once on each side, three full ones and two halves.

The Galveston's arms are 8 inches by 4 at their outer ends, and the circular braces or rings, 6 inches.

COATING PADDLES WITH MATERIALS THAT REPEL WATER.

If any substance can be found durably to prevent paddles from being *wetted*, they will then carry over less water with them. We coated one set with grease, (suet,) and while the water streamed uniformly over the faces of the others, it adhered only in narrow streaks to these.

Besides the paddles described, some others were tried, but as they involved different principles, and were not of very practical application, their introduction here is not necessary.

CONCLUSIONS.

The lessons which the foregoing experiments teach us are:

That, to render paddles of steamers more effectual, they ought to be fashioned, as far as circumstances sanction, after models furnished by nature, so as to conform to her general practice of contracting surface when resistance is of little avail, and extending it when the latter is greatest, to give the largest portions of blades the longest strokes, at the same time tapering their extremities.

That the fewer the paddles on a wheel the better, provided *one* be always kept in full play; and hence, that it would be more advantageous to point or fork them, as proposed, to evade the jar of their striking on the surface, than so perniciously to split and multiply them, as the popular practice is.

That smooth and thin metallic plates should be substituted for the usual massive water-soaked planks. (At present, perhaps, nothing better than boiler plates, galvanized, could be adopted.) That bolt-heads, nuts, cleats,

straps, and every other projection upon or about them, should be provided against. That the arms of wheels ought to be reduced at their outer extremities, and the immersion of all superfluous material carefully avoided. That, when wheels require balancing, or their momentum to be increased, the weights should be attached to the arms above the surface of the water.

That paddles, and other parts that plunge with them, should be coated with varnish, or some other substance which repels water, in order that the fluid, instead of being dragged up in volumes by them, may roll off, as from the backs of diving birds.

These experiments, it will be borne in mind, have reference chiefly to the *figures* of propelling blades—to determine how far the question of power is involved is another matter, and requires another class of experimental investigations. To do anything well, is to do one thing at a time. After determining the best figure, the next inquiry is the outlay of power; of this, however, we may be certain: as close relationship exists, and the same mutual dependencies pervade, the several parts of artificial as of natural machines, a defect in one member is felt in all. Where figure is distorted or proportions neglected, more or less power is squandered.

ADDITIONAL OBSERVATIONS AND ILLUSTRATIONS.

An abiding conviction of the importance of the subject, and of the value of the preceding experimental results, has elicited the further observations and illustrations which follow.

The principles by which steamers are to be impelled over oceans with rapidity and economy of power, are as definite as any that give effect to a lever or screw, and as fixed and unalterable as those of nature herself. To discover them is the business—the chief business—of the philosophical engineer, and not till this is done can his achievements be free from the taint of imperfection and corresponding failure. It is discreditable that the true outlines of propelling blades have not been determined, and the rather since it is a proof that the full bearing of the question involved has to be felt—that the potential influence of form and proportion in propellers, as well as in the hulls of steamers, has yet to be investigated.

In the following PLATES are a few out of millions of gradations of form—from the slowest to the quickest—which show that the greater the velocity, the longer, narrower and sharper they are; and the converse, as speed is diminished, the shorter, wider, and blunter they become—the same rule applying to ornithologic as to ichthyological organs of motion. There is something exceedingly interesting as well as instructive in marking the changing outline—in observing that fish, e. g., improve in speed as their *rounded and undivided* tails emerge into a *triangular* figure; next, as they become *indented*; and lastly, *lobated* and *pointed*, the quickest of all.

Such appears to be the general process, subject of course to many modifications, in order to meet the requirements of diversified habits and instincts. Still, wherever a fish is seen with a round or roundish and unbroken tail, it may safely be set down as a comparative slow mover; while deeply indented ones are, without exception, indicative of rapid flight.

Round and Roundish Propellers.—The cat-fish, an inhabitant of most of our rivers, common in the Potomac, and its habits well understood, is selected as a fair representative of slow movers, since there are probably as many species inferior to it in this respect, as there are that excel it:—PLATE I, fig. 1. The general contour of this fish does not seem unfavorable to speed; the propelling blade is also very large in proportion to the body, notwithstanding its movements are comparatively slugged.

PLATE I,

Is dedicated to slow and comparative slow swimmers. Fig. 2 is the caudal fin of the sole, found in most of our Atlantic streams. The propelling blade is here almost a perfect circle, while in the kindred flounders it varies from this to a sharp triangle. The idea of activity or of a moderate speed is never associated with these tribes, nor could it, since they are among the poorest of aquatic rangers.

Fig. 3: The agriopus—a type of blade common to shoals of indifferent swimmers. Not a few of the Chetodons—ocean's butterflies, as they have been named from their brilliant and variegated colors—and other inactive occupants of tropical seas, have propelling oars formed after this pattern. The instrument wielded by the toad-fish of the U. S. coast is not unlike it, only more elongated; while other families have it forming a mean between the two. Both flounders and toad-fish, for lack of speed, often seize their prey by stratagem; covering their bodies in mud or sand, no sooner do their unsuspecting victims come within reach than they are seized and swallowed.

Fig. 4. The pelor of Japan, from Cuvier—another of the toad-fish family. Here the outer rays are lengthened and nearly straight, while the posterior margin preserves the rounded form.

Fig. 5: A perch from Cuvier. The body is apparently adapted for quick flight, and has a large area of propelling blade; but the rule or law assumed is not here violated. This fish is far from being a rapid mover. The form of blade is very common; the curve of the posterior boundary being more depressed than in the preceding, and but slightly more convex than in the jaculator. This last fish is an expert gunner, but an indifferent swimmer. Feeding on insects that hover about aquatic plants, he shoots them with pellets of water ejected from his mouth, and generally with certain and deadly aim. His speed is greater than the preceding, but less than

Fig. 6: The lettered serranus. A type of *triangular blade*, and of quicker swimmers than the preceding; one common to myriads of finny tribes. Convex boundaries have here all but vanished, the exterior rays of the organ being the longest, and the posterior margin nearly a right line. In the striped bass, or rock-fish, and in the Southern kingfish, this margin becomes slightly concave, in which respect they represent a great variety of fishes.

Increased speed accompanies the *triangular* and *indented*. In the yellow perch, fig. 7, this form of outline begins to appear; the posterior margin being cut away so as to present the nuclei of lobes. Now this familiar fish is known to be, what the contour of its propeller declares it should, be far less agile and swift than its kindred and constant associate, the white perch, whose caudal fin is shown at fig. 8. Both are taken at all seasons, in the Potomac. Fig. 9, is the sucker or mullet of the same river, and fig. 10 the smelt, whose caudate lobes are still further brought out, and whose superior activity in the water is known to every angler.

PLATE II.

Lobated and Pointed: On PLATE II. this progressive development of motive lobes is continued up to those of the swiftest of known swimmers. A mere glance at the figures in connection with those just described, will suffice to show how invariably and uniformly speed is accelerated by lengthening and pointing the propelling organs. (The figures are not drawn to one scale.)

Fig. 1: American herring, and fig. 2, the shad—both too well known migrators to need remark. The sketches are, like most of those on PLATE I, from nature.

Fig. 3: The mackerel. A family known to have great power in the water, and to swim with what has been termed incredible energy. It has a wide geographical range—some are supposed to cross the Atlantic from the Mediterranean, and, visiting our coast, are met with from Maine to Florida.

Fig. 4: The dolphin. Accounted among the swiftest of swimmers. Excessively voracious, it hunts its prey with impetuous speed, and is a terrible enemy to flying-fish and other aquatic game. It plays round ships under full sail, and apparently without effort. A specimen in the National Collection measures two feet from the nose to the point of lobal divergence. The lobes are ten inches long, and only one and a half wide at their junction; they are somewhat nearer to each other than in the living fish.

Figs. 5 & 6: The bonita and tunny. Well known marine foragers, from whose theatres of depredation few of their prey can escape by flight. Both are allied to and formed on larger scales after the mackerel model. The lobes are divergent, those of the former nearly at right angles to the body.

Figs. 7 & 8: Sword fishes. The first common in the Atlantic, and with its sharp and elongated lobes, rapid flight is instinctively associated. The momentum acquired by it may be imagined from the fact of its weapon having been repeatedly driven through the solid timbers of ships. The latter is from Cuvier. In these creatures their whole power is concentrated in the caudal fins, and enables them to rush on their prey with the impetus of falling meteors. Of varieties, the East Indian sword-fish figured at large (fig. 9,) surpasses all others in velocity and the force with which it transfixes its victims. The chief use of its high dorsal fin is to steady the body in the line of its flight.

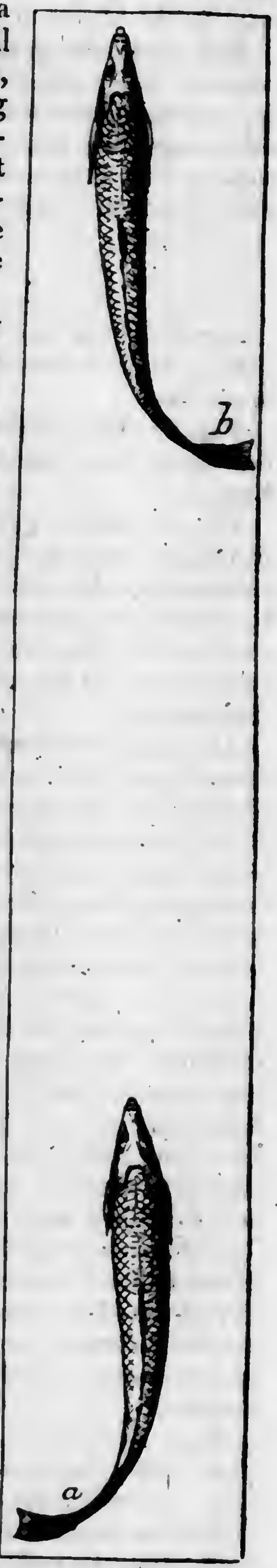
The air and outline of the body of this remarkable creature, with its long, tapering and acuminated propelling lobes, impart universal conviction of its powers of flight, just as the reverse impression is felt on viewing any of the slugged movers. Were the space between its blades filled up, it would at once become one of the latter, and, without an accession of motive energy, one of the slowest among them.

Fish, like birds in the atmosphere, are impelled onward by a succession of impulses. When the fins strike slowly, the resulting starts or bounds are observable; but in high speed the strokes follow each other in such quick succession that an apparent uniformity of motion is the result.

Laying out of view all sculling action, let the broad and undivided lobe *a*—(the lower figure in the marginal cut, page 613) be in the position in which it is prepared to push the fish forward, viz: to unbend and bring itself to a line with the axis of the body. Now in doing this, the extreme posterior margin passes through a greater space in the same time than those parts near the body, and consequently produces the greatest effect. If this margin had no slip, then those parts would be absolute impediments, and a portion of the power would be uselessly consumed in forcing them laterally against volumes of water whose reaction would not further the progress of the fish. Were such organs rectangular and inflexible boards, this would at once be obvious; it would then be seen that the parts toward the body, instead of assisting, would be positive hinderances. What such boards would be to fishes, they are, in fact, to our steamers, although having little dip, the evil is not so apparent in them.

It is conceded that where the organs are very short, this obstruction nearly

vanishes; but with such, high speed cannot be atained for want of sweep, while with long and broad ones it is realized only with a surplus expenditure of vital force. A most beautiful compromise between the two has therefore been devised, viz: *caudate lobes*, in which the central and obstructing portions of undivided blades are removed, the sweep increased, and a maximum velocity obtained with the least possible amount of propelling surface, and at a minimum expense of motive power. This is the way nature makes her fast swimmers, and it is the one by which we should construct ours.



Although the lobe *a*, has been alluded to as describing a curve in the water while unbending itself, in practice it is hardly so; at any rate not when a quick-going fish is at its maximum flight. The organ then acts more like an elastic substance rebounding from a wall; for its action against the fluid is so rapid that the latter has not time to yield ere the fish has shot forward to the second position at *b*, and is in the act of taking another stroke. The lobes, in thus unbending, follow up their first impulses somewhat as do bowstrings the arrows shot from them.

Unequal Lobes. — Those just described enable their owners to progress with equal velocity in all positions, each pair being uniform in dimensions and outlines: but suppose groups should exist whose habits and instincts require them to dart faster through the ocean in some courses than in others; we might then expect corresponding changes in their blades, and such changes should either confirm or shake the positions assumed. Now there *are* those, and among them conspicuous occupants of the deep, which can only fulfil functions assigned them in the economy of nature by travelling quickest in particular directions. How are they enabled to do this? By novel forms or by new arrangements of motive organs? No, but by a device which, like an *experimentum crucis*, establishes the principles contended for.

Fishes that hunt their prey, or escape from their enemies in courses *inclined to* the *horizon*, are provided with unequal blades; those from which increased vigor in the destined directions is to come, being most developed. Thus classes to whom the highest speed is essential in descending, have the superior lobe prolonged; while in such as fly or forage upwards and consequently to whom a maximum of velocity in that direction is indispensable, the inferior one extends beyond its fellow. Furthermore, the degree of inequality is proportioned to the angles formed by the lines of ascent and descent with the horizon. In this very remarkable provision for enabling certain groups to move with the greatest rapidity in the direction most essential to their existence, we have collateral evidence, extensive and emphatic, in support of the proposition that

the more rapid the flight the longer and narrower, within certain bounds, must be the blades of propulsion.

This inequality in motive organs is believed to be unique: nothing like it occurs in other departments of nature. Both wings of a bird or of an insect are uniform—identical in contour and proportions. So also the paddles of swimming birds and of amphibia. In none does one of a pair exceed in dimensions the other. To this singular deviation, so illustrative of artificial as well as natural proportion, PLATE III. is dedicated.

PLATE III.

Fig 1: From Cuvier. The centrolophus. Some mullets have their caudal fins formed after this pattern—the lower lobe slightly projecting past the upper one.

Fig. 2: The Gibbous sucker—common on the Atlantic shores, in which the under lobe protrudes still further, but is exceeded by that of the carp, Fig 3.

Fig. 4: Silver salmon or piabuco of Brazil—from Bloch. 5: The pacu of Guiana, from Nat, Library. 6: Flying fish, the extended lobe being the chief means of enabling it to spring out of its native element. 7: Shark-tailed hypostoma of Guiana—a fish little larger than a herring. The under lobe exceeds the upper in length by at least one half, and is strongly spined at the extremity. In Fig. 8 the disparity is still greater: it belongs to the genus Stromateus.

In the following specimens the order is reversed—the upper lobe it will be seen begins and continues to preponderate. Of Fig. 9, the common bull-head of the Atlantic coast, the caudal fin is long, nearly even and undivided. In 10, the speckled redmouth, cresent shaped, has seventeen rays and the upper lobe extended somewhat more beyond its fellow. In 11, the northern crab-eater, the difference is more marked. This active fish, varying from 20 to 30 inches in length, ranges over a wide extent, being found equally on the coast of Africa and America. Fig. 12, a species of perch from Bloch.

Fig. 13: Ruby-colored etelis, from Cuvier. 14: Mackerel shark, a terrible forager on the family whence its prenomen is derived. 15: The sleeper-shark—the figure represents also pretty accurately the propelling organ of the sturgeon, one of the strongest of swimmers—a blow of its tail has broken a fisherman's leg. The same pattern of blade is seen in the sterlet. Fig. 16: The porbeagle shark from State Natural History, New York. The superior lobe of a specimen caught in New York waters, was two feet long, and furnished with a dilated fin near the tip—the inferior one ten inches. The stomach was filled with fishes. Like most of its relatives it revels among shoals of shad, and pursues with equal success the fleeter mackerel. 17: The shovel-nosed or hammer-headed shark—singular in its contour and dreaded for its boldness, ferocity and velocity. One caught on Long Island shore had its stomach dilated with detached parts of a man, together with his garments.

Fig. 18: The thresher or long-tailed shark, known also as the fox-shark and swingle-tail, is the most remarkable of unequal lobates—the blade often exceeding the body in length. The upper lobe of one in the National Collection is six feet seven inches long, eleven inches wide where it joins the body, and five inches at the middle of its length. The lower lobe only six inches long. In traversing the ocean diagonally—inclined to the horizon—

this animal would undoubtedly beat the East India sword-fish; but in a race laterally the latter would leave the thresher behind.

Sharks exhibit a singularly apparent exception to the law which developes the superior lobe in excess in tribes that seize their food in the act of diving. From the recession of the lower jaw they are compelled to snatch their prey from below; but to do this they turn on their backs or sides, and hence the appropriate elongation of the upper propeller, both for overtaking and grasping their victims.

The saw-fish belongs to the shark family, and resembles the sword-fish in the position and length of its weapon. In full grown individuals the terrible instrument is over six feet in length, and the whole often plunged and buried in the body of the whale. Rushing from a distance and accumulating momentum as it goes, the force acquired has driven the saw through the timbers of a ship.

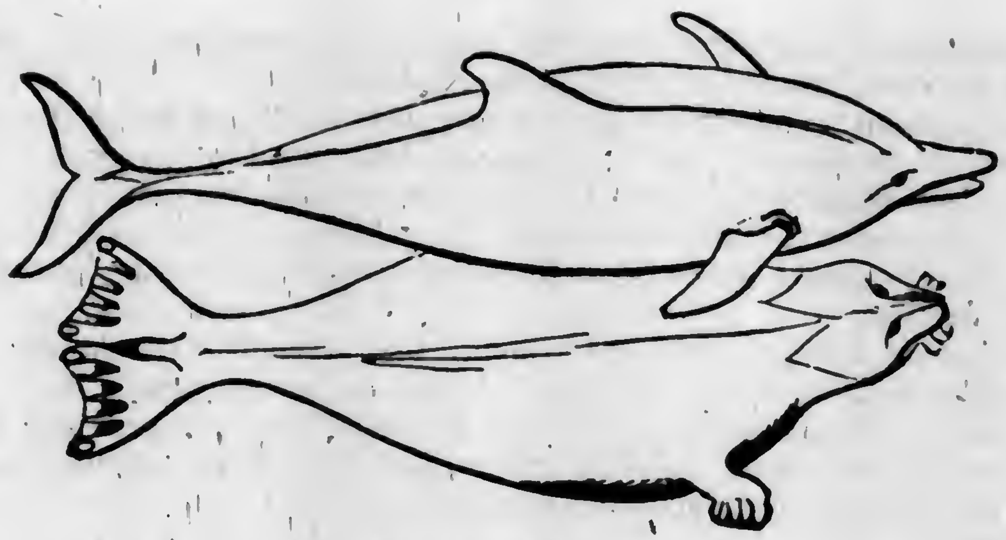
To contrast the extremes of inequality in lobates still further, the blade of the garfish, Fig. 19, is introduced from a specimen recently caught in the Potomac where they are common. It consists of one lobe only—not a nucleus of an under one is visible. The scales and vertebræ, or muscular part of the body, end by a sweep towards the upper margin, and there vanish. This feature prevailed extensively in remote epochs and the present genus is remarkable as furnishing the only existing representatives of fossil families. Food was probably found chiefly at the bottom of ancient oceans.

Before taking leave of ichthyological propellers, specimens of other varieties given on PLATE I, from figs. 11 to 20, inclusive, may now be glanced at. In them we see how nature cuts away material and alters forms with the nicest discrimination, to meet infinitely diversified habits and movements. Where surface is useless it disappears—where beneficial it is made to shoot forth.

Fig. 11: Black bass, common on the coast from Florida to Cape Cod. It presents a remarkable conformation of the outer boundary which, contributing little if anything to speed, is intended to influence movements, to meet requirements which naturalists may not yet have discovered. In the next figure—12—king-fish, the same feature is more strongly but somewhat differently marked.

Fig. 13: The Brazilian bodian (from Bloch) size of the carp. 14: another variety of sea bass. The next is tridentated, a Chinese carp. 16: the orange file-fish, rarely found in N. York waters. Fig. 17: the larimus from Cuvier, and the nebris has the same form—both of the perch family. 18: another lancet-shaped one, from the same. 19: the long tailed unicorn of New York waters. 20: the horn fish or sea-bull, from Bloch, an inhabitant of East Indian seas—of curious structure, but one singularly ill adapted for speed.

The triangular form is found in amphibia. In seals, (see the adjoining cut,) the hind legs of quadrupeds are thrown back and united at the heels; each foot retains its five toes, which answering the purpose of radial ribs in tails of fishes, give strength and form to the connecting membrane, presenting a blade resembling those of the striped bass and salmon, figured on a previous page, while both produce a tridental posterior margin, and a general outline akin to that of the sea-bass, figured also on the page referred to, exhibiting moreover, a striking likeness to the paddles of swimming and diving birds. In sea-leopards, sea-bears, lions and kindred animals, each foot becomes lobed, furnishing analogues of ornithologic podiceps. From analogy, these creatures should be better divers than seals, but whether they have been sufficiently observed to determine this point, I know not.



Porpoise and Seal.

As the movements of seals consist more in diving than in long lateral journies, the blade is transverse. So it is with whales, which have it lobated. Breathing air, they cannot remain long under the surface without suffocation, hence it is essential that they should have the power of rapid ascent and descent. The tail as well as the body of the porpoise, is adapted to great speed, and with what ease a shoal approaches a ship from a distance, plays round her, and disappears in the horizon, navigators are familiar.

Toads and frogs are other illustrations. The propelling blades of the latter are more pointed than those of the former, and they are known to be by far the best swimmers.

Fore and hind leg of a frog—half the natural size.

Had we been acquainted with frogs only from geological casts, we should have inferred their agility in water from the configuration of the hind feet, and the long jointed rods that wield them. This tribe of batrachians has the reputation of surpassing all four-footed creatures in swimming.

PLATE IV.

The superiority of pointed paddles is interestingly manifested in the musk-rat, figures 1 and 2. This animal in its habits and dimensions, is akin to the ornithorrhynchus, or water mole of New Holland, fig. 3, and although with little or no membrane between its toes, is said, by those conversant with the habits of both, to be much the best swimmer. True, its superiority may be in some slight degree attributable to the use of its tail as a propeller, yet, notwithstanding this, the large undivided membranes of the

foreign animal might have been thought sufficient to secure the advantage. Beavers and otters present other mammalian examples.

Of swimming birds' paddles, fig. 4 is that of the trumpeter swan, which, like most of its kindred varieties, is a powerful swimmer. Even when wing-broken, it passes through the water with great rapidity, and if not otherwise hurt, an oarsman in the best constructed boat can rarely overtake it. Fig. 5 represents those of the gull family—all poor swimmers and worse divers, notwithstanding the expanse of propelling surface. The penguin, fig. 6, leaves them immeasurably behind, with less face of blade. Quick on the water, and quicker under, penguins are thought by some the swiftest of swimming birds. They capture their prey by chasing—not by artifice.

Fig. 7: The Canada goose, and 8 the left foot of the fishing gannet—which bird, while surpassing the gull, does not equal the cormorant in gliding through the liquid element. A cormorant's right and left foot are figured at 10 and 11, the outer toes of the latter being the longest, and thus making the blade more acutely triangular. The gannet, cormorant, and pelican have an additional membranous section—the hind toes in them being fully developed, while a nucleus only is seen in the gull, penguin, and nearly all feathery natants. In the cormorant the area of the inner membrane is slightly larger than the middle, as it also rather exceeds the outer one. In the gannet, this order is reversed.

Fig. 9: A portrait of a cormorant. Of these birds it is remarked; they swim deep and dive with great expertness, so that it is all but useless to follow one when only slightly wounded. At times they swim under water with astonishing speed, pursuing and securing their prey, using their wings as paddles, and their tails as rudders.

Figs. 12 and 13: The grebe, among birds, furnishes an example of lobated paddles. The figures are specimens taken on the Potomac, where they are proverbial for agility and speed, disappearing at the flash of the sportsman's gun, so that ere the shot reach their position they are yards beneath and away from it. With flint locks they are hardly ever hit, and even dodge the best percussion caps. Indentation is here carried so far as to change a propelling blade into three distinct divisions, one governed by each toe. They rarely fly; their wings are imperfectly developed, and they have scarcely the rudiments of a tail. Water is their proper element, and in the levers by which they work their paddles, a remarkable display of design is manifested, in so shaping the bones of the legs as to impart the greatest strength with the least material, and of such a form as to encounter the least resistance in the direction in which they act. In the figures exhibiting this feature 13 is a side view, and 12 a front one; hence the section, instead of a circle, as in other birds, is rather like that of a knife blade. In grebes, penguins, and cormorants, the legs are placed far behind, so much so that, to preserve the centre of gravity when standing on shore, they have to throw their bodies in a perpendicular position.

The fact is as full of significance as any fact connected with the subject can be, that, of all known varieties of soaring and natant propellers, existing or extinct, none can be quoted to conflict with the views urged in this essay. On the contrary, the closer they are examined the clearer becomes their testimony, and the more conclusive. Were they applicable to organs moving in one medium only, they might be questioned; but we find nature sanctioning them in aerial as in aqueous motive implements. She adheres to them everywhere.

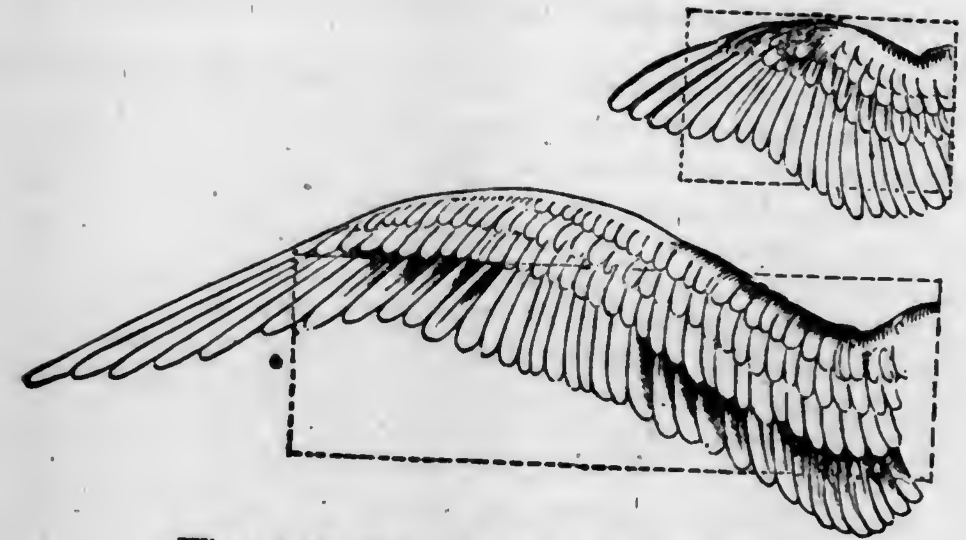
Bats, connecting quadrupeds with birds, have a large sheet of wing, composed of angular and pointed divisions. Their movements in the air resemble those of butterflies, and, although quick in changing their direction of flight, they cannot be classed among swift soarers. Both they and lepidopters illustrate the fact that speed does not depend upon a large expanse of wing, so much as upon *form*. It is this that exercises a controlling influence. From examples given in PLATE VI. it will be found that the fleetest of birds, as well as of fish, are indebted more to contour and length of blade than to surface.

Carolina bat's wing, half the natural size.

Frugality in outlay of material, and consequently of power, is seen in every piece of mechanism turned out of nature's workshop. Sufficiency without surplus—enough and not an atom over—are proverbs with her. An example worth mentioning occurs in bats. In flying organisms the tail is a rudder by which changes in the direction of flight are more or less promptly attained. It is so with bats, most of which prey on flies, which they hunt and swallow on the wing; but some feed on fruits, and these, requiring no such steering apparatus, have none.

Among entomological illustrations are the sharp angled wings of butterflies, as the Jasius genus, known to surpass cognate tribes in flight. Of insects whose organs may be classed among lobates, is the sphinx, or hawk-moth family, remarkable for narrow and elongated wings. Then there is the boldest, fleetest, and most voracious of insectivora, the dragon-fly, preying on bees, wasps, and hornets, and far more readily overtaking butterflies, notwithstanding their broad expanse of wing. This fiercest of hunters has been described as darting from angle to angle with the velocity of thought, and as rapidly darting back—not turning in the air, but with a clash reversing the motion of its propellers.

In the next cut, a wing of the partridge and one of the frigate bird, *both of a width*, are placed together, illustrating the difference of form and proportions in the wings of slow and quick flyers: the latter extending further into the resisting medium than the former, agreeably to the universal rule in air as in water propellers, *increased speed* invariably accompanying *increased dip*, and vice versa—a rule we have not attempted to follow in our steamers, and hence the comparative failure of our labored efforts. We cripple the flight of domestic and other birds by cutting portions from their pinion feathers. So far as flying is concerned, a partridge may be considered a frigate bird with its wings clipped; and the cod a dolphin with its caudate lobes truncated.



Wings of the partridge and man-of-war bird.*

For vigor and activity of wing the *tern* families are celebrated, and there is a strong resemblance in the conformation of their wings and tails to those of the tropic bird; the arctic jager, a most active plunderer, no sooner perceives a gull to have made a successful plunge, than he pounces on and makes it yield its prize. His wings are long, narrow, and very acute: so are those of the shearwaters, a class of oceanic plunderers whose flights are extremely rapid and protracted. See fig. 5, PLATE VI.

PLATE V.

Naturalists have long since pointed out the fact that the power of flight in birds depends on the shape and structure, not on the area, of their expanded wings. These organs have been arranged under six different heads, and in the following order: acuminated, falcate, pointed, rounded, ample, and abortive—a division too minute for popular illustration. Acuminated, i. e., long, tapering, and sharply pointed wings, "are those adapted for the most rapid and long continued flight." Examples of this form are seen in the oceanic genera, and among land birds the swallow is a familiar example; another is furnished in

Fig. 1. The swallow-tailed hawk. The flight of this elegant species, says Audubon, is singularly beautiful and protracted. It moves through the air with such ease and grace that it is impossible for any individual who takes the least pleasure in observing the manners of birds, not to be delighted by the sight of it on the wing. Gliding along in easy flappings, it rises in wide circles, to an immense height, inclining in various ways its deeply forked tail, to assist the direction of its course; dives with the rapidity of lightning, and suddenly checking itself, reascends, soars away, and is soon out of sight. At other times a flock of these birds amounting to fifteen or twenty individuals, is seen hovering around the trees. They dive in rapid succession amongst the branches, glancing along the trunks, seizing in their course the insects and small lizards of which they are in quest. Their motions are astonishingly rapid, and the deep curves which they describe, their sudden doublings and crossings, and the extreme ease with which they seem to cleave the air,

*The proper proportions have not been preserved in the above cuts. The former is too long, and the other too short. To Titian R. Peale, Esq., one of the naturalists of the Exploring Expedition, and now an examiner in this office, I am indebted for some of the preceding illustrations.

excite the admiration of him who views them, while thus employed in searching for food.

Of falcated or sword shaped wings, humming birds afford numerous diverse specimens. They have little or no taper, except at or near the tip.

As a specimen of pointed forms, the wings of the chief of feathered races—chief as regards size, strength, and the elevation of its flight—may be quoted. Breeding on the summits of the Cordilleras, inaccessible to man, the condor cruises at altitudes lost in the depths of the firmament to human vision, but whence it watches and darts on its forest prey with the swiftness of lightning. A full grown bird measures from the point of the beak to the end of the tail only five feet; but from the tip of one expanded wing to that of the other, nearly *fifteen* feet. The velocity of its flight and the acuteness of its sight and smell may be inferred from an observation of Von Tschudi—"When a bait is laid, it is curious to observe the number of condors that assemble in a quarter of an hour, on a spot near which not one had been previously visible"—arriving from opposite parts of the horizon, and some from distances apparently below it. The largest, and it is presumed the heaviest of birds, dwelling in so rarified a medium as the Andes, and careering in strata still more attenuated, is a significant fact to the engineer—significant as showing how the propelling organs of this bird launch out into the medium it moves in; i. e. how increased dip, with increased weight, bulk and velocity is kept up.

Fig. 2: The argus pheasant, remarkable for a superabundant development of wing, and yet among the poorest of flyers. The body is not larger than that of an ordinary fowl, but its length from the beak to the end of the tail is over five feet, the tail feathers being three feet eight inches. Its general aspect does not strike one as unfavorable to moderate velocity, yet it not only rises with difficulty, but its flight is heavy, and kept up only over short spaces. In this bird we have an example of blunted or rounded wing united with ample surface, and attended with very imperfect results.

Fig. 3: One of the wrens, birds whose flight is short and slow. Fig. 8: the domestic fowl, is another example of rounded wing, and, as usual, is associated with laborious and indifferent flying. The gallinaceous or rasorial birds are intended to abide principally on the ground—hence their toes are arranged for walking and running, while their organs of flight are less powerfully developed—their wings are short, and like all short wings, are rounded. Birds of this order, as the Guinea-fowl, turkey, peacock, &c., have all short and blunted wings, and consequently are described as possessing in a very imperfect degree the faculty of flight.

A specimen of abortive wings is shown at fig. 4. The organ in the ostrich is a large circular blade, which never raises the bird from the ground. The mallard or wild duck, fig. 5, is a type of the pointed form; few birds so heavy have so small an amount of propelling surface, yet they travel with great velocity, and their migrations extend from the tropics to the polar regions. With slight variations the wings of parrots and many smaller birds resemble these. The passenger pigeon, fig. 9, belongs to the same class; a bird proverbial for its long and rapid progress across the firmament. They have been killed near the city of New York with their crops full of rice collected in the plantations of Georgia or Carolina; and as this food is digested by them entirely in twelve hours, they must have travelled three or four hundred miles in about half that time—sped through the air at the rate of a mile a minute.

The greatest powers of flying are enjoyed by the different groups belonging to or representing the natatorial order, to which alone those are confined that catch their food in the air—albatrosses, frigate-birds and petrels are consequently among the most expert flyers of feathered races. In the fissirostral tribe we see the same faculty given in a pre-eminent degree to swallows, swifts, night-jars, bee-eaters, &c.

Figs. 10 and 11: Examples of acuminated wings, the most perfect specimens of which are seen in the oceanic genera. Fig. 11 is the tropic bird, celebrated as a remarkably rapid courser, but having a development of rudder unfavorable to quick evolution, its flights are generally direct. Like the frigate-bird, it is found soaring over the remotest parts of the ocean. The wings are described as long, acute; primaries strong, tapering—the first quill longest, and the rest rapidly graduated; the tail of twelve feathers—the two middle ones extremely elongated.

Fig. 12: The frigate pelican, or man-of-war bird, which has been instanced among the most powerful soarers in creation. The figure is from nature—a specimen in the National Collection. The organ is three feet two inches long, and eight inches at the greatest width. The body of the bird, from the point of its bill to the fork of the tail, is twenty-two inches, and to the extremity thirty inches. The speed of this bird is proverbial, and, by means of its double rudder, it changes the direction of its flight with marked celerity—a property the albatross has not, because of its short, broad tail. Hunting within the tropics, such is its power of flight that the air would seem to be its theatre of rest as well as of activity, since it is scarcely ever seen reposing on the water. A pirate by profession, it watches the movements of gulls, tropic birds, boobies, &c., and, soon as they rise, compels them to drop their prey, seizing it as it falls.

Audubon has some interesting memoranda. The wings, he observes, are extremely long and pointed—the first quill longest, the rest rapidly diminishing; the tail very long, deeply forked, of twelve feathers. When incubating, their long wings and tails are seen extending beyond the nests for more than a foot. Those about the Florida Keys are seen passing with the swiftness of thought over trees, and snapping off, as they fly, dry twigs for their nests, with a single grasp of their powerful bills. Only two other birds he knew perform such a feat—the forked-tail hawk and the swift or chimney swallow—but neither are so expert as the frigate pelican. Sometimes this bird drops a stick while travelling to its nest: when this happens over water, it plunges and recovers it before reaching the waves. Mr. A. thinks this bird possesses a power of flight superior to any other. However swiftly the cayenne tern, the smaller gulls, or the jager move on the wing, it is a matter of mere sport for the frigate-bird to overtake any of them. The gos-hawk, penguin, and gyr-falcon—the swiftest of our hawks—are obliged to pursue a green-winged teal or passenger pigeon at the highest pitch of their speed, and at times for half a mile, before they secure it; but the frigate-bird comes on it with the velocity of a meteor.

Fig. 13: A wing of the wandering albatross—a bird for endurance of flight probably unrivalled. Found over all parts of the Southern ocean, it seldom rests on the water, save in calm weather. During storms, even the most terrific, it is seen, now dashing through the whirling clouds, and now serenely floating, without the least observable motion of its outspread pinions. The figure is from a specimen in the National Gallery, in which the length exceeds

4 feet—the breadth at the widest part being only 8¼ inches. The lower edge of the organ is composed of a single row of feathers, forming an outline thin and sharp; while the upper, or front part, is 1¼ inches thick with bone, covered with numerous layers of plumes. At the last joint, towards the tip, the thickness is over an inch—the transverse section resembling that of a razor-blade. The tail is only 10 inches wide at the widest, and 8 inches long from the root.

The two central figures of the plate, 6 and 7, are the partridge and the black tern; they serve to contrast the rounded with the acuminated form—one of the poorest with one of the best of flyers. The career of the tern is graceful, light and extremely rapid. During autumn they hunt for food over the wet prairies, skimming along and picking what they find, without lighting. Between them and the partridge the contrast is as striking as that of the jager and the argus pheasant. The wing of the partridge extends not to the end of the rump, while that of the other is at least double the length of its body.

PLATE VI.

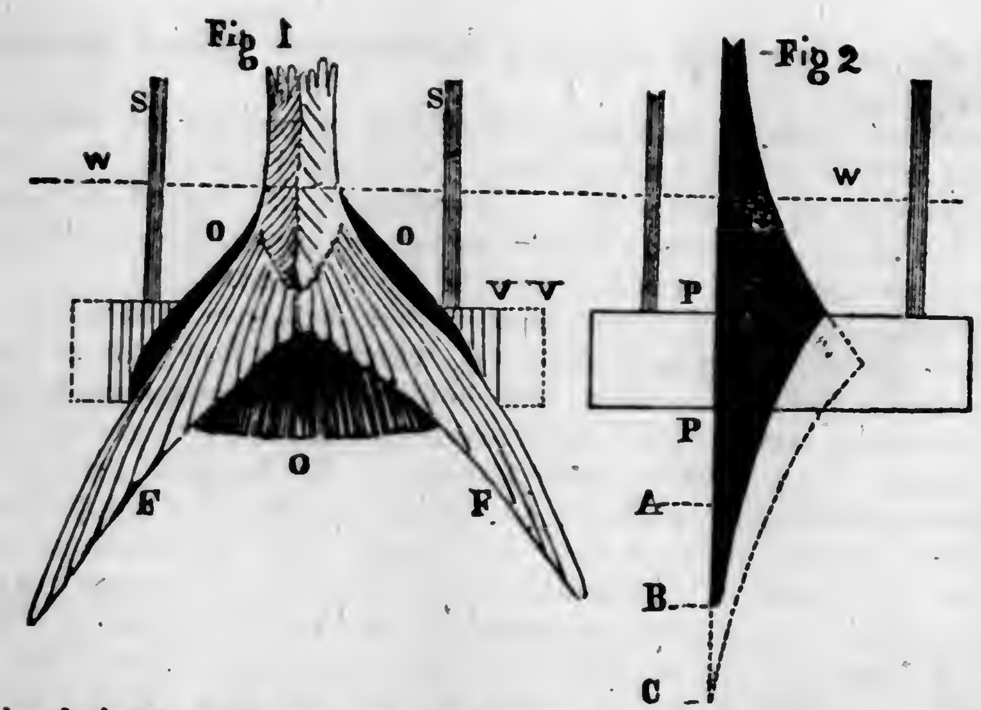
In PLATE VI the figures are designed to contrast the contour of *our* paddles and the connection of their broad sides to the levers that work them, with those shaped and joined by the UNERRING ARTIFICER. Some minds are awakened only by extremes of dissimilitude, when a glance often does that which ordinary reasoning fails to accomplish.

Let it not be imagined that anything like caricature is here intended: the purpose is simply to make manifest to the eye the difference between the perfect and imperfect; and *that*, under all circumstances, in philosophical or mechanical disquisitions, is not only justifiable, but useful; at least to those who are more readily convinced through the senses than the intellect alone. Admitting a very wide distinction between a natural and an artificial organ, still, were a parallelogram or a square a legitimate propeller, in the highest or lowest scientific sense of the term, its absurdity, when applied as represented in the plate, could not be so apparent—so repugnant to reason and to ordinary apprehensions.

The laws of propulsion are founded in nature; nothing can change them—nor will they yield a jot or a tittle to our pre-conceived views and opinions. The idea of extending paddle-blades 20 feet and upwards from a vessel's side—to make them what they are, in fact—"flash wheels"* skimming up water from the surface, instead of obtaining increased hold by increased depth close by the vessel—is one so unphilosophical, that it probably will not be sanctioned much longer.

From the foregoing, it is most manifest, that nature's plan of increasing speed in aqueous organisms, is antipodal to ours—that ideas which prevail with her are wide of those by which our engineers are governed. An additional illustration or two to this point, and the subject is left to those whose interest it is to pursue it.

* Used for throwing water up slight elevations, for irrigational purposes.



Let the dark triangular part of the figure (1.) o, o, o, be the caudal paddle of a jaculator, fresh water bass or cod—all slow swimmers. Now, the problem is, to make the same amount of propelling surface give double or treble velocity to other fish of equal or even greater bulk—to impart, for example, the speed of the dolphin to a cod. How is this done? Why, invariably, by bifurcating it and employing the material removed to *extend the lobes* as at F, F. The propelling lever now extends further from the fulcrum, and consequently has not only greater hold on the water, but makes a larger stroke or sweep through it.

Suppose W, W, the water line, and the parallelogram V, V, a steamer's blade, attached to the arms S, S. The vessel's speed is required to be increased. How is it attained? Almost always by adding to the surface laterally at V, V. Thus, as has been remarked, the ocean steamers now in progress in New York—supposed to embrace every possible improvement—have the paddle planks 14 feet (some boats have them 22 feet!) stretching that distance from each side of the vessels; as if half the surface, disposed after nature's mode, would not be equally efficient and with the *same power;* for, saving of power is as essential a result of improvement in form, as of approaching the truth in any other particular.

Suppose P, P, fig. 2, represent one of these enormous blades about to be enlarged to make a vessel go faster, is it not apparent that by altering its figure to that shown by the dark tint, the rule of nature being followed, superior results must ensue; and this not by adding to, but actually dispensing with about one-half of the propelling surface. Were the boundaries extended to the dotted lines, the area would still be nearly one-third less than the original. In this type of blade a quality unknown in common ones is revealed, viz: every horizontal section bears a like amount of strain, and contributes equally to the work done, although the areas differ so materially; thus the portion included between the lines A, P, from the larger sweep it has to take, equals the larger portion between P, P; and for the same reason the section A, B, equals A, P;—*increased range compensating for diminished surface.**

*This is a point which, I believe, no engineer has yet brought out. The idea is a new one in artificial propelling.

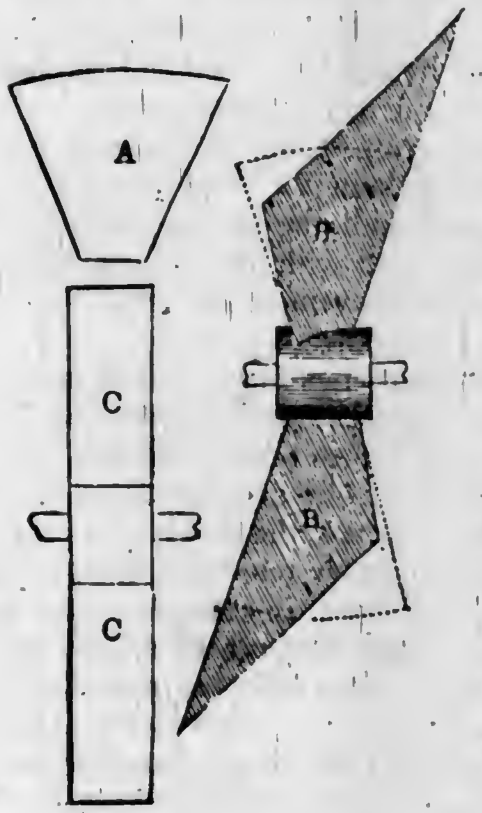
In this, also, we see there is nothing accidental, or without deep meaning, in nature's plans.

The ordinary mode of increasing the efficacy of paddles has been to widen the levers instead of lengthening them. Thus the jar arising from 14 to 20 feet planks striking the water, is a constant source of destruction to both vessel and machinery, while with blades, as figured above, it is annihilated, and the enormous amount of power consumed by it, saved.

Some boats have wheel-houses wide as their decks, so as to make it doubtful, in the eyes of strangers to such craft, whether the hulls are accessories to them or they to the hulls. Who, on beholding a steamer approach, her sharp bows protruding between two enormous drums, is not reminded of a panting animal borne down between two burdens? As has just been remarked, there are vessels whose paddle-blades are 22 feet planks. Adopt the principle here presented, i. e. throw away the planks, and with them tons of useless wood and iron—cut off nine-tenths of the portions of the shaft extending over the sides—leave nothing on each end but one set of *arms*, which lengthen and fashion after the caudate lobes of the dolphin or sword-fish; or the wings of the swallow or frigate-bird—and our steamers, no longer allied to awkward and slow-moving organisms, will resemble, in velocity and flight, those from whom the figure and proportions of their motive organs are borrowed.

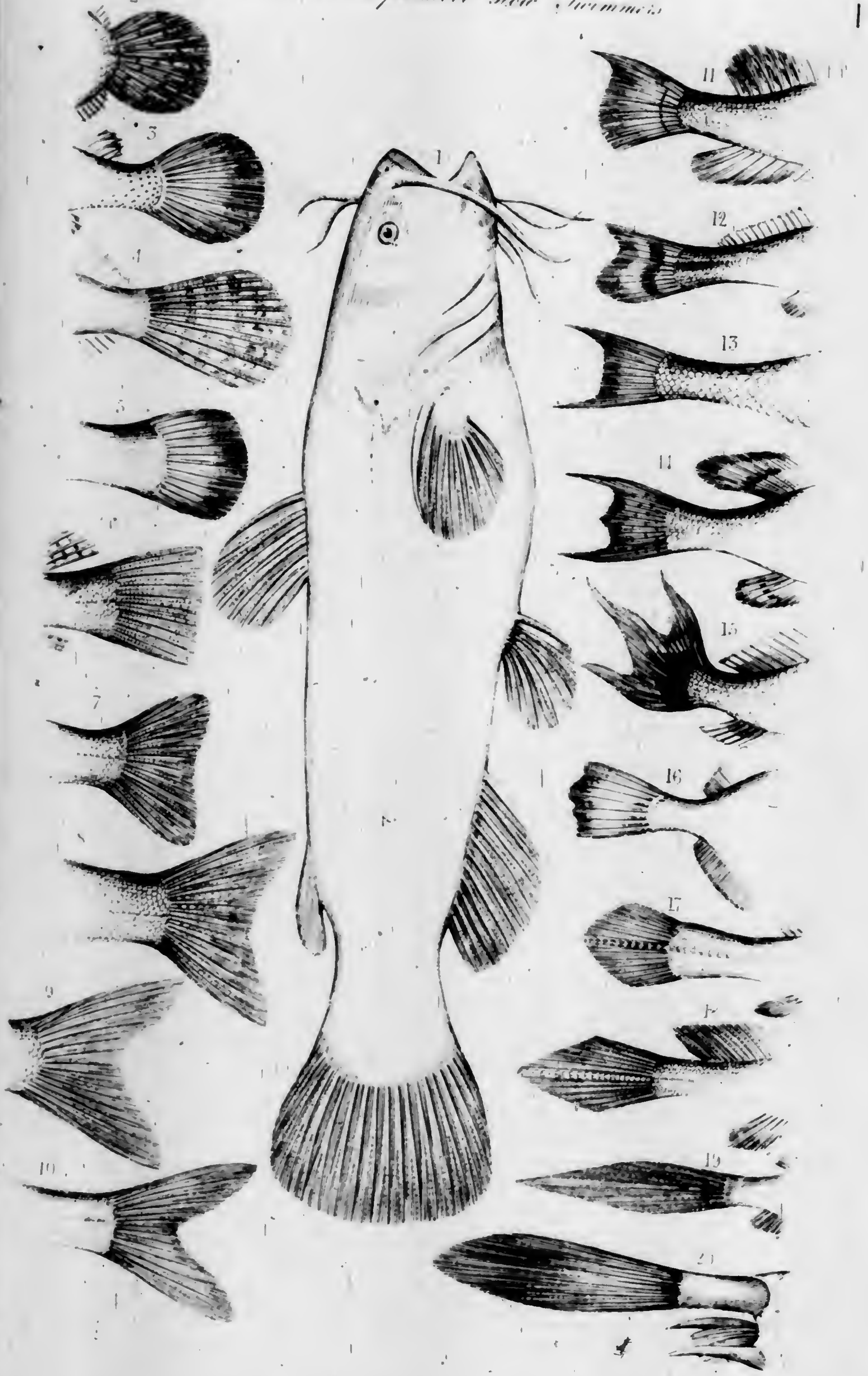
If nature ever took extra pains to teach engineers a lesson, she has done it here; and let them forget not that "Nature and Philosophy are *never* at variance."

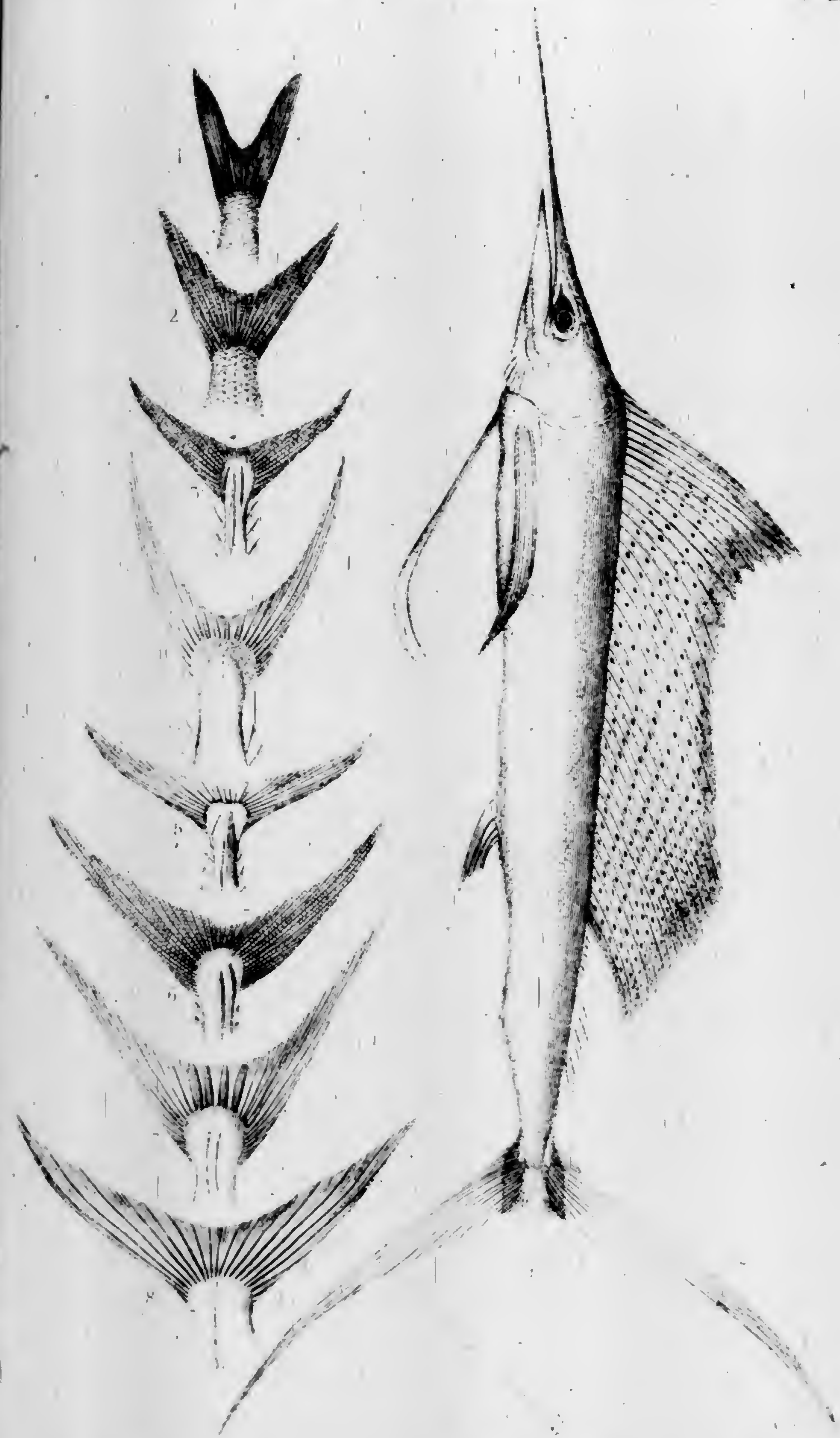
Devices for readily lengthening and shortening the arms, so as to vary the dip with the changing draught of a vessel, and accurately to adapt it to he power of her engines, are also worth adopting.



The principle is of course equally applicable to stern submerged propellers—revolving sculls or screws. In these the ancient forms are the latest also. Those last patented were proposed over a century ago. A is an outline of Woodcroft's, patented here in 1846, and in England previously. Those of Stevens, Loper, Ericson, Smith, and a host of others, have the same sectorial form. Their resemblance to the tails of slow-swimming fish is obvious to every eye. Would it not be better to make each more like the lobe of the most agile and swift, as at B, B? A rectangular blade—not unlike one belonging to a paddle-wheel attached to the axis endwise, as at C, C, has also been recommended, though on what grounds it is not easy to perceive. The *Great Britain* steamship had blades resembling those figured at C, C.

Slow & comparative slow Swimmers — Pl. I.

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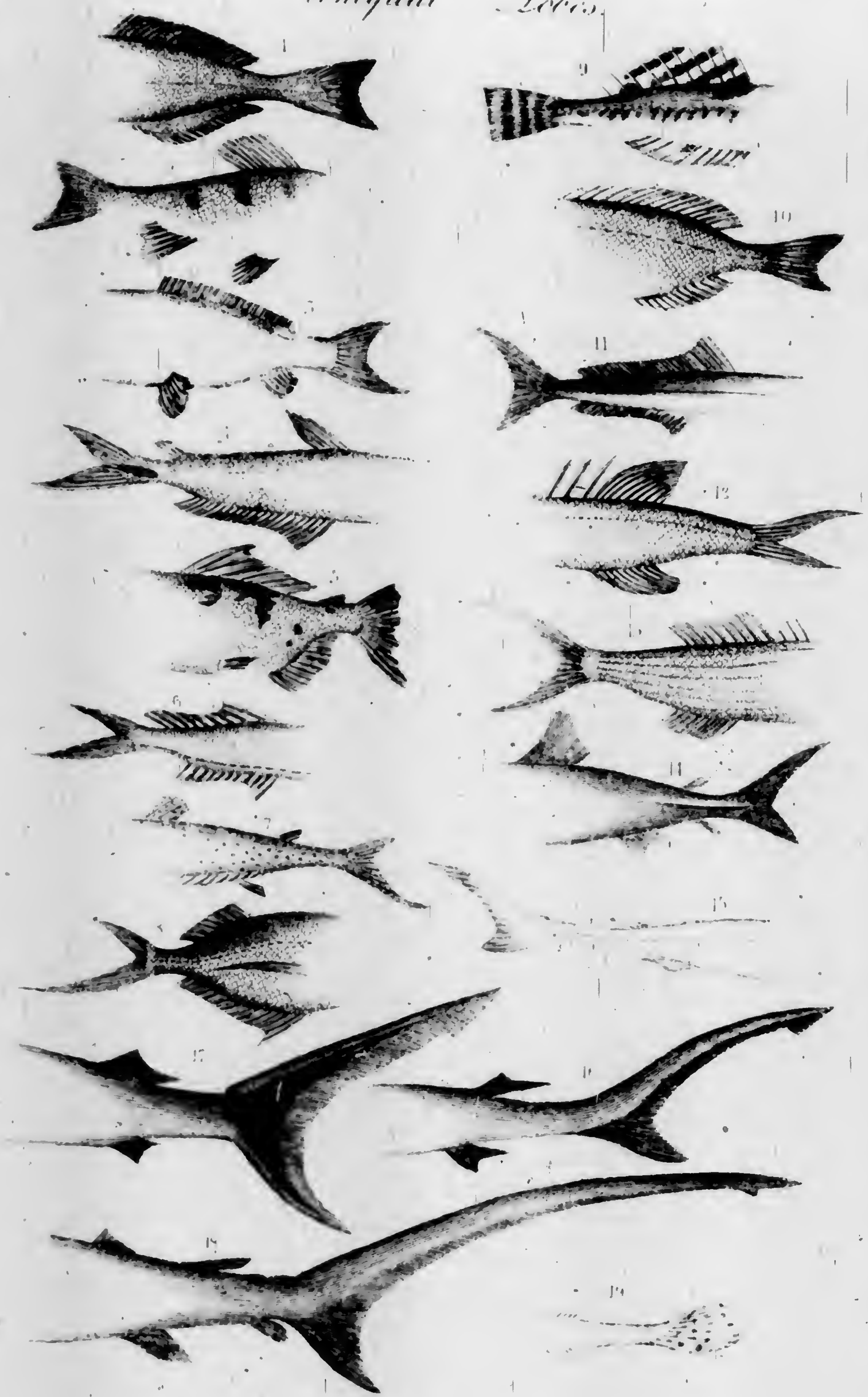
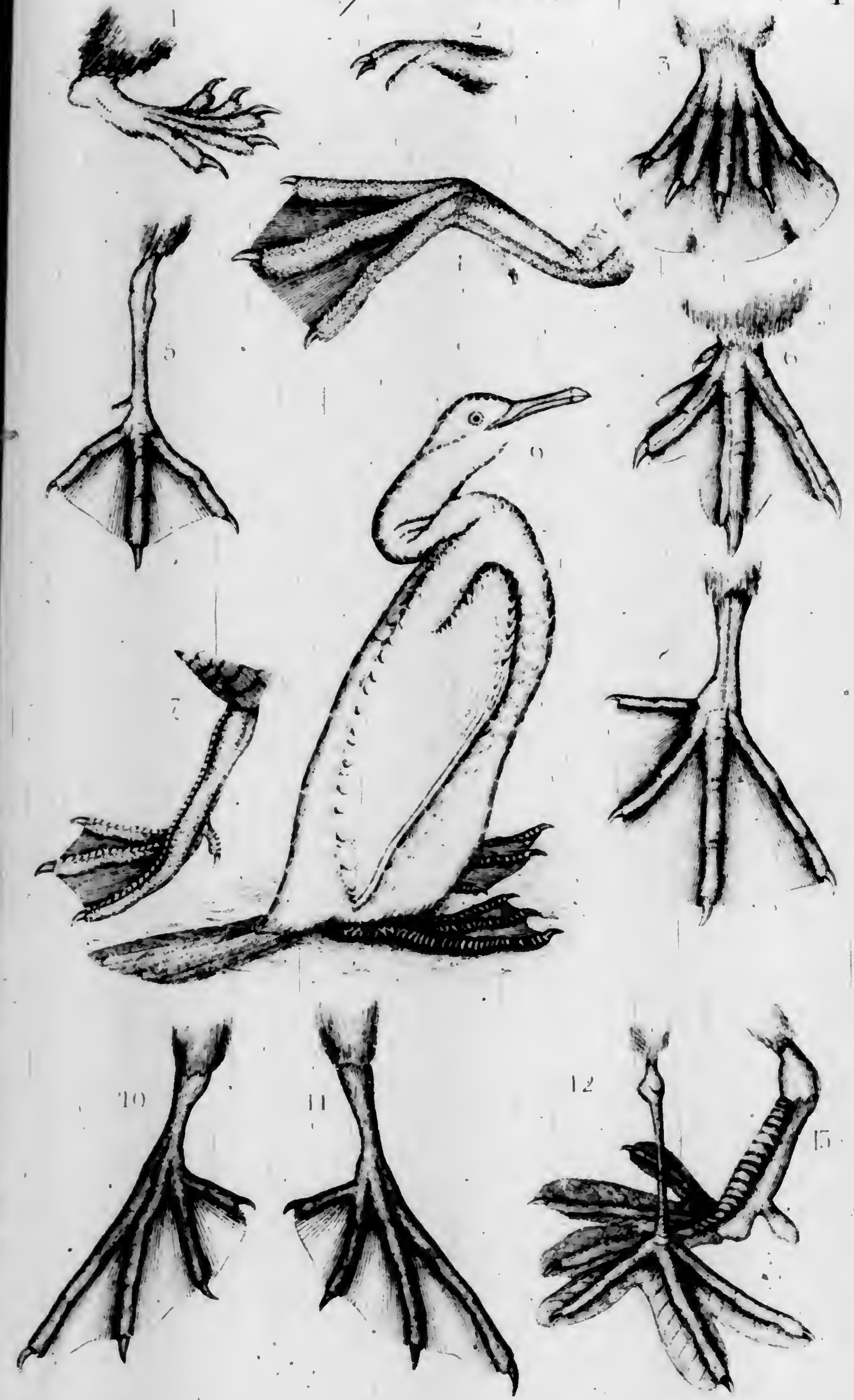
Unequal Lobes. PL. I

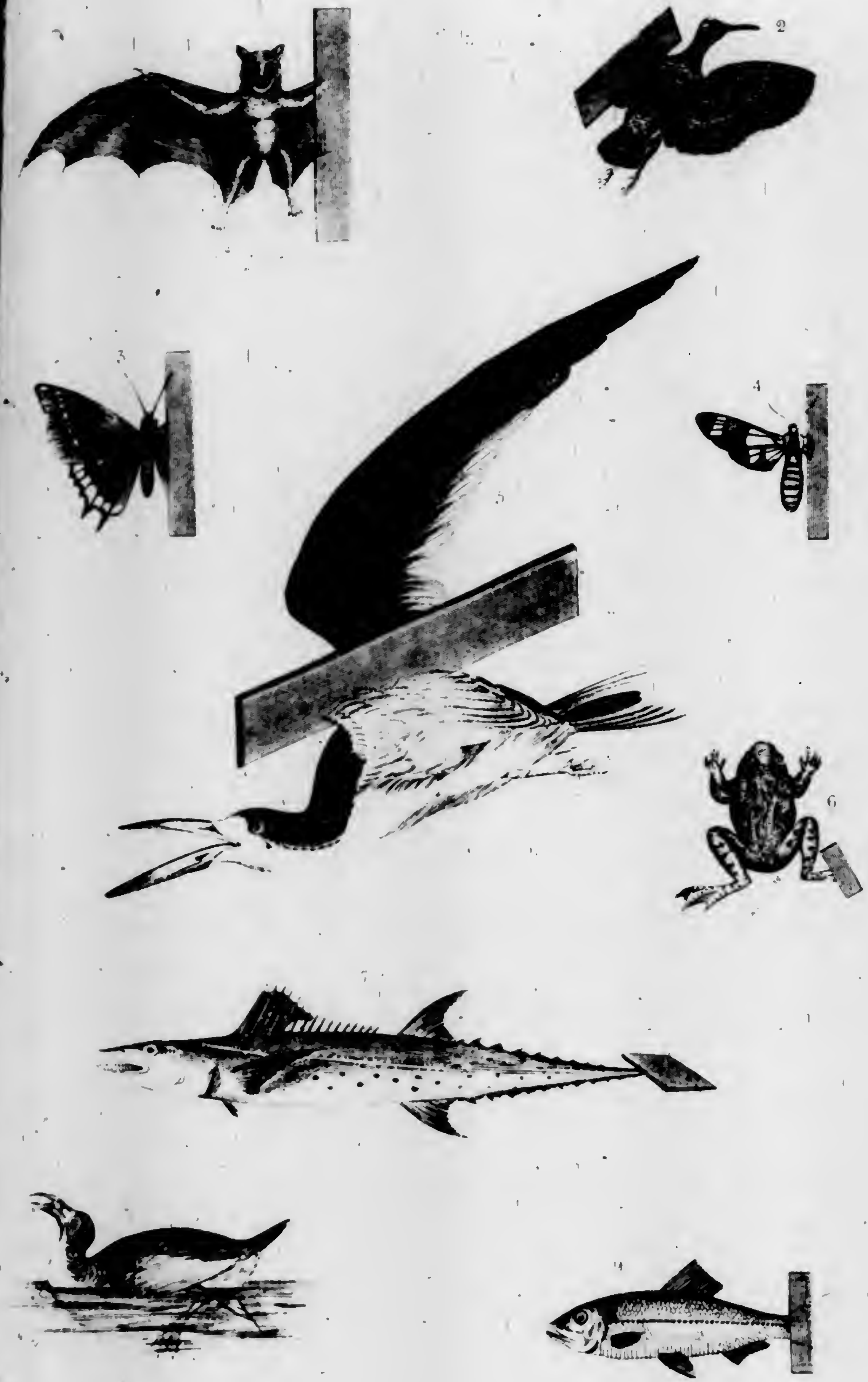


Surface Paddles PL. IV.



Aerial Propellers PL. V.

Natural contrasted with artificial Propellers. Pl VI.



CONCLUDING REMARKS ON PROPELLERS.

From the specimens of nature's propellers quoted, (and they represent countless millions from every division of the animated kingdom for which air and water are the theatres,) we see that those creatures possessing the powers of locomotion in the greatest perfection are furnished, not with remarkably *large propellers*, but with long, narrow, and pointed ones—in no case bounded by straight lines. There is a meaning, a deep meaning, too, which engineers have not yet perceived, in this absence of rectangular and right-lined boundaries—this lengthening, forking, and pointing—this uniform effort at angularity.

If it be conceded that nature is an exponent of the Divine Inventor's ideas, and consequently of the truest philosophy of mechanics—that as an economist of power and material she cannot be excelled; and in the forms, adaptations, and results of her machines, she is absolutely perfect—does it not become us to consult her on a subject which she has so profusely illustrated, and attend, as it were, to one course, if not more, of her lectures?

If she has nowhere adopted the figure of our steamers' buckets, (nor anything like them,) in the multiplicity of her submerged propellers, nor in her surface paddles, nor in the motive implements of amphibia, nor in the countless swarms of minute aqueous beings—if, so far from approaching, she has carefully avoided it in her swimming and diving myriads, from the leviathan of the ocean to the minnow of brooks and the animalculæ of our cisterns—what are we to think? That she is chargeable with awkwardness in her work, and ignorance in the selection of means proper to her end? and that the shape we have contrived for urging both large and small bodies through water is better than any of hers? Or, shall we not rather confess that in adhering to ancient practice* we MAY be wrong; and resolve, instead of blundering on longer in the dark, to consult her at once, by testing her forms and proportions against ours?

Then, what is still more eminently significant, she confines not her favorite principles to water, but displays them in as high relief in another fluid; as if to show us, by endlessly diversified organisms sporting in different media, the demonstrations of her plans. In the wings of birds, bats, insects, and every aerial soarer, from the condor to the mosquito, as also in the feet of water fowl, from the largest to the smallest, the quickest to the slowest, she tenaciously holds on to *angular forms* and *pointed extremities;* thus elucidating and enforcing her views of the doctrines of propulsion, as relates to both air and water, by arguments enchanting and conclusive.

Admitting, to the fullest extent, that artificial organs can seldom follow literally the contours of natural ones, still is it not remarkable that in the *infinity* of her modifications of propelling blades, she has rejected everything like a parallelogram or a square; and has, moreover, *never* united the broadside of one to the body that it is to move, or to the levers that are to work it—on the contrary, making the connexion invariably at an angle!

To the last remark it may be objected by the querulous that the *sciurus*

*Our steamers' wheels differ in nothing material from those used over twenty centuries ago in Roman galleys. In early printed books the blades of paddle-wheels are figured as now. See the Nuremberg Chronicle of 1493; Rivius' German Translation of Vitruvius in 1548; and editions of Valturius, and other old writers on military affairs.

volans is an exception. Not so; this, though named one, is not a flying animal; the expansion of skin uniting the fore and hind legs is a buoyant, not a motive implement. It has no play, but merely serves to keep the little creature from descending as quickly on taking a leap, as it otherwise would. Whatever slight progression it makes on passing from one tree to another, over and above what is due to the spring taken at starting, is ascribable to the sinuous or sculling motions of the tail, and this application of that member accords with what naturalists tell us of companies of voyaging squirrels of Lapland, crossing in calm weather rivers, and even extensive lakes. Each individual launches and manages its own canoe—a piece of bark—using its tail as a propeller, and the air as a resisting medium.

There are those who smile at the idea of engineers and machinists studying Nature's contrivances; and such, on perusing the preceding suggestions, will deem it a sufficient reply to remind the proposer that steamers are not black-fish, nor paddles salmons' tails or petrels' feet. But minds differently organized think a glance into her work-shops is never amiss, and that the longer the visit the better for the visiter, since there is no art or contrivance—and it is certain that through eternity there never can be one—which has not its prototype in her collections. If we find them not, it is because of inattention, or an imperfect acquaintance with her stores. Perhaps we know not at which of her ateliers to inquire, or are not prepared to appreciate specimens laid before us when we enter.

As already intimated, no person expects to find in living mechanisms exact copies for artificial articulations; but when a mechanical principle, and the instruments through which that principle is manifested, are before us—when we see motion communicated to a class of organs, comprehend their construction, effect of their forms, modes of their action, and dynamic results—there is no difficulty in making such deviations, as difference in materials, powers to be employed, and conditions under which the artificial machine is required to act, may require. It is the perfection of invention thus to *imitate* Nature—the maturity of science and art to tread in her steps.

There is matter of the highest interest and deepest curiosity in this subject of natural propellers. To any single division folios might be dedicated; every step taken in the investigation being attended with the revelation of new truths in mechanical science.

Respectfully submitted:

THOS. EWBANK.

WASHINGTON, January 16, 1850.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

VOL. 1, 1849

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS

VOL. 2, 1849

REPORT

OF THE

COMMISSIONER OF PATENTS,

FOR THE YEAR 1849.

PART II.

AGRICULTURE.

Contents.

WASHINGTON:
OFFICE OF PRINTERS TO HOUSE OF REPS.
1850.

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REPORT

OF THE

COMMISSIONER OF PATENTS.

PATENT OFFICE, WASHINGTON, 20th *April*, 1850.

To the HON. HOWELL COBB,

Speaker of the House of Representatives.

SIR:—PART II. of the Report of this Bureau for 1849 is herewith respectfully submitted.

It is devoted exclusively to the great and growing interests of Agriculture; and is accompanied with further researches by Professor Beck on the breadstuffs of the United States; besides general remarks on the adaptation of soil to the culture of the cereals, value of American breadstuffs, nutritious properties of various kinds of food, &c. Prof. B. gives the results of analyses of wheat and of wheaten flour from New York, New Jersey, Pennsylvania, Maryland, Virginia, Ohio, Michigan, Illinois, Missouri, and Wisconsin; of wheat and flour shipped for exportation from various ports of the Union, and of the same substance, the growth of Canada, Chili, France, and Spain.

With the view of adding to the general interest and to the popular value of this portion of the annual *exposé*, the Secretary of the Interior directed that the task of collating and arranging the materials for it should be committed to a practical and scientific agriculturist. This has accordingly been done, and in the following pages will be found the result.

I have the honor to be,
Most respectfully,
Your obedient servant,
THOMAS EWBANK.

SIR:—Agreeably to your request, I have prepared, and have the honor herewith to submit, some remarks on the Statistics and Progress of Agriculture in the United States for the year 1849.

The communications received in answer to the Circulars issued from the Patent Office in the usual form, number some four hundred. Not a few of these are extended essays, and all contain useful facts or suggestions, which have been gratuitously furnished by the contributors. To publish the whole would require two large volumes in place of one of moderate size; and to reject three-fourths of the matter in hand seemed a poor return to the many gentlemen, in almost every State, who have kindly proffered their services to promote the most important interest of the Republic.

Under these circumstances, it was thought not amiss to rewrite and greatly condense three-fourths of the letters and essays intended for the Report. This labor has been great, and has not been performed without assistance; but it has saved some ten thousand dollars in printing, and, it is hoped, with improvement to the document, and without doing injustice to any correspondent.

The undersigned deems it not out of place to offer a few suggestions in reference to the ways and means now available for the improvement of American Agriculture.

Agricultural Education.

Since 1823, when Judge Buel introduced the first bill to establish an Agricultural College in the State of New York by legislative aid, constant efforts have been made to render the study of rural economy as a *science*, not less than its practice as an *art*, popular in this country. Twenty seven years have now elapsed—a whole generation has passed off the stage—and New York, with her five hundred thousand cultivators of the soil, is still without the first agricultural school worthy of the name; nor is any other State in a better condition. Dark as this view of agricultural education really is, it is the darkness that precedes the dawn of a bright and happy day. Men who have labored for the improvement of Agriculture, and the elevation of Agriculturists, for a quarter of a century, with little of hope and less of pecuniary reward, now realize the beginning of an auspicious change in public sentiment. Thanks to agricultural journals and societies, the people will soon discover that labor and capital, devoted to tillage and husbandry, are as worthy of legislative consideration as labor and capital employed in mining, commerce, and manufactures. So soon as this truth shall be fairly comprehended, the long struggle of the friends of improvement will be crowned with success, and the victory won over both ignorance and its traditions.

It is indeed wonderful how long those enlightened, reasoning farmers, who, like Washington, cherish a due respect for their high calling, have had

to beg and beg in vain of State Legislatures, and of Congress, for a little assistance to prevent the universal impoverishment of American soils. Whatever has been done to arrest the exhaustion of arated lands has been effected not only without due aid from Government, but in spite of a mistaken policy, which encourages the removal of all the elements of bread and meat from cultivated fields, and their speedy transportation beyond the possibility of restitution. Neither the earnest recommendation of the illustrious farmer of Mt. Vernon, nor the prayers of two generations of agriculturists, nor the painful fact that nearly all tilled lands were becoming less and less productive, could induce any Legislature to foster the study of agriculture as a science. Happily, this term, when used in connection with rural affairs, is no longer the subject of ridicule. Some pains have been taken, in this Report, to prove that one thousand millions of dollars, judiciously expended, will hardly restore the one hundred million acres of partially exhausted lands in the Union to that richness of mould, and strength of fertility for permanent cropping, which they possessed in their primitive state.

The continued fruitfulness of the earth is an interest far greater and more enduring than any form of government.

If the twenty-two millions of people now in the United States may rightfully consume the natural fertility of one-third of the arable lands of the country, the forty-four millions who will be here twenty-five years hence may properly extinguish the productiveness of the remaining two-thirds of all American territory.

A great principle is involved in the science of agriculture, which reaches through indefinite generations, and forms the basis of all possible improvements, and of the highest hopes of our race. All advancement is impracticable in a country that closely approximates the condition of a desert. As a nation of farmers, is it not time that we inquire by what *means*, and on what *terms*, the fruitfulness of the earth, and the health and vigor of its invaluable products, may be forever maintained, if not forever improved?

These are questions of universal concernment, to the careful and rigid investigation of which no man should refuse to lend a listening ear. A governmental policy which results in impoverishing the natural fertility of land, no matter by what popular name it is called, must have an end. It is only a question of *time* when this truly spendthrift course, this abuse of the goodness of Providence, shall meet its inevitable punishment. To show the necessity of reform, a plain estimate has been made, in the chapter on "Agricultural Statistics," to prove that we annually waste enough of the elements of bread, without which not the first kernel of corn can be formed, to produce one thousand million bushels of this important staple.

The Board of Agriculture of the State of Ohio estimates the crop of corn in 1849, within the limits of that State, at seventy million bushels; and it will hardly be extravagant to say that the farmers of Ohio, Indiana, Michigan, Illinois, and Wisconsin export a million tons of breadstuffs and provi-

sions where they import one ton of the atoms drawn from their virgin soils, to form agricultural products. Can it be said, in truth, that a million tons of bread and meat are produced from *nothing?* Will it be contended that the earth within the reach of good ploughing contains an unlimited amount of the precise things consumed to make the plants, whose organic and inorganic elements are taken from the soil and never restored? If this be true, then all fertilizers are not only unnecessary, but absolutely worthless. This cannot be so, for lands that, seventy years ago, produced from twenty-five to thirty-five bushels of wheat in the State of New York, now yield only from six to nine bushels per acre; and in all the old planting States, the results of exhaustion are still more extensive and still more disastrous.

A lack of mental culture and discipline is the most serious impediment to the diffusion of agricultural science among the mass of farmers. Its language is to them an unknown tongue. Hence the most sublime truths in the economy of nature are shut out from the popular understanding. It is feared that this will ever be the case until schools, designed to teach those branches of learning which the practical farmer greatly needs, but does not possess, are established and maintained throughout the United States. So long as we refuse to plant the seed, it is folly to expect a rich harvest of knowledge.

We over-estimate the value of mere physical strength, like that of the ox or mule, and under-estimate the intrinsic worth of cultivated, well-developed reason, in practical agriculture. No inconsiderable degree of mental culture must precede all scientific tillage and husbandry. An oak is not matured from an acorn in a day, nor in a year; nor is it possible to form, in a single generation, a universally educated and highly improved race of men. Such improvements, to be general and fixed in a people, as a distinguishing feature in their character, must be deeply impressed on several successive generations.

As a class, farmers have few advantages for being well informed in the rapid progress now making in the economical improvement of soils, cultivated plants, and domestic animals. This lack of opportunity is a serious misfortune, and leads to this practical result: With five million farm laborers—two million seven hundred thousand in the slave-holding, and two million three hundred thousand in the free States—American agriculturists so misdirect this immense power of production, that the injury done to one hundred million acres of land is nearly equal to all the apparent net profits on the whole rural industry of the country.

To illustrate an important fact as well as principle, let us suppose a farmer produces crops worth one thousand dollars, and they cost him, including all expenses for labor, wear of implements, interest on capital, &c., eight hundred and fifty dollars. Nominally, he has a profit of one hundred and fifty dollars. But it often happens that, if he should undertake to replace in his cultivated fields as much of potash, soda, magnesia, phosphorus, soluble silica

and other elements of crops, as both tillage and cropping had removed, it would cost him one hundred and seventy-five or two hundred dollars to effect that purpose. It is only by *consuming the natural fertility of the land* that he has realized any profit.

In a national point of view, all labor that impoverishes the soil is worse than thrown away. No fact in the science of political economy is more important than this. To reduce a field, which in its virgin state produced forty bushels of corn per acre, down to twenty, in ten years, and then cultivate it forty years and harvest only twenty bushels per acre, in place of forty, is equal to a loss of four hundred bushels of corn per acre, or one-half the diminished product, without any equivalent whatever. Thus to impoverish land is to wither the muscles of both man and beast employed in its tillage.

Human toil is often praised for being highly *productive*, when, had the whole truth been known, it would have been seen to be remarkably *destructive.*—Labor never creates a particle of new matter by ploughing deep or shallow: but it frequently places the elements of grain, cotton, and provisions beyond the reach of all scientific farmers who may live hereafter and find the soil wanting in the raw material for making human food and raiment. There appears to be no government that realizes its duty "to promote the public welfare" by widely diffusing among its citizens a knowledge of the true principles of tillage, and by impressing upon them the obligation which every cultivator of the soil owes to posterity, not to leave the earth in a less fruitful condition than he found it.

The Ravages of Insects.

Such insects as Hessian and wheat flies, curculios, weevils, army and boll worms, annually destroy crops to the amount of twenty millions of dollars. If a pirate on the high seas, or an Indian savage on land, injures the property of a citizen to the amount of a few dollars, millions are expended, if need be, to punish the offender. This is right. But when public enemies of a different name do a thousand times more injury to a whole country, are its citizens under any necessary restraint which forbids their making a common effort to protect their property from insect devastators? Parasitic plants, such as rust on wheat and many fungi, as well as injurious insects, are on the increase. To attempt to explain the reasons *why* this is so, would lead at once into questions in animal and vegetable physiology, out of place in this brief synopsis of such rural topics as are believed to be of general interest.

It may not be amiss to remark, however, that many boys are apparently educated to kill all small birds that subsist mostly on insects, so soon as these youngsters are large enough to shoulder a gun.

Government can do much to check the ravages of insects by collecting and diffusing useful information as to their habits, times of transformation,

and the best means of destroying or avoiding them. If farmers fold their arms and say that nothing can be done, by the science of entomology, or by any other means, what but an increase of the evil is to be expected? Not to *try* to escape the infliction is treating one's enemies with unmanly forbearance, and evinces a belief in fatalism worthy of a disciple of Mohammed.

Analysis of Soils, Marls, and Fertilizers.

Something should be done in reference to the analysis of soils, fertilizers, marls, and other minerals constantly sent to the Patent Office for that purpose. For many years, chemists and philosophers have been investigating the affinities and other peculiarities of "molecules" or ultimate indivisible particles of matter. These scientific researches have revealed many important truths and natural laws, which have a direct bearing on all the economical purposes of agriculture. Some pains should be taken to impart a knowledge of these laws to all practical farmers. When we consider how little opportunity the mass of agriculturists have to study the chemical composition of their soils and crops, it can readily be seen that information of this kind is greatly needed in all operations which aim to feed cultivated plants with their appropriate aliment.

Professor Henry, the distinguished Secretary of the Smithsonian Institution, has authorized me to say that the extensive chemical apparatus and excellent laboratory of the Institution will be at the service of any reputable chemist, to make investigations for the increase and diffusion of knowledge in this branch of science.

I have compiled for this Report about one hundred analyses, embracing most of the cereals, several grasses, clovers, legumes, roots, cotton, tobacco, flax, and the ash of fruit and forest trees, from the latest European and American authorities. These analyses will be found valuable for reference.

An elaborate paper on the "Study of Soils," giving the chemical composition of their parent rocks, the amount of the elements of crops in a cubic foot of earth, available as food for plants, together with researches into the annual production and consumption of mould, the variation of the temperature and hygrometric properties of soils, has been deferred to keep this document within a moderate size. For a similar reason, no space has been allowed for mere *guesses* at the quantity of grain and other crops grown in the year 1849.

The Preservation of Provisions.

The science of preserving meat, lard, butter, cheese, and other animal as well as vegetable substances, used as food for man, has received very little attention in this country. This neglect causes a loss of many millions every year. To say nothing of the bad taste of eating so much frowy and rancid butter at home, full one-half of all that is sent to England and other foreign countries is sold at half the price of sweet butter, by reason

of the defective manner in which it is manufactured and put up for market. American farmers have great advantages for the economical production of beef and pork, mutton and wool, and it will render them a valuable service to obtain from Europe correct information of all discoveries and improvements, either in the growing and feeding of domestic animals, or in the curing of provisions.

Few are aware how susceptible of improvement is the living machinery which elaborates *milk* for nearly every family in the Union. There is a reliable account, in this Report, of a dairy of forty-one cows, kept in the State of New York, which yields sixty-two dollars in butter, cheese, and milk, as the product of each cow a year. From the returns of the last State census, it is safe to say that one million one hundred thousand cows are now milked in that State, which are supposed to yield about twenty dollars per head. To improve these up to an average annual product of thirty-one dollars each (that is, to one-half what the best large dairies in the country now yield) would add twelve million one hundred thousand dollars to the income of the citizens of a single State. This gain, by the improvement of one kind of rural machinery, would be equivalent to creating a capital of two hundred millions of dollars, and placing the money where it would yield over six per cent. interest in perpetuity.

If all the sheep in the United States gave as good returns in wool for the food consumed, as the best one hundred thousand now do, it would add at least sixty million pounds to the annual clip of this important staple.

In one of his letters to Sir John Sinclair, General Washington says, in substance, that, at the time he entered the public service in the War of the Revolution, his flock (about one thousand) clipped five pounds of wool per fleece. Seven years after, when he returned to his estate, his flock had so degenerated that it gave an average of only two and a half pounds per head, which was the common yield of Virginia sheep then as it is now.

Although the numerous importations of superior sheep, cattle, horses, and swine have greatly benefited the country, it must be admitted that much has been lost by suffering improved animals to deteriorate. Every wool grower should ponder well this fact. If two and a half pounds of wool will pay the whole cost of keeping a sheep a year, five pounds will pay one hundred per cent. profit on that cost. Washington was eminently a "book-farmer," and was anxious to gain knowledge from the educated agriculturists of Europe and of his own country. His overseer believed in keeping sheep as his father did, and was opposed to all innovations in husbandry.

There are now not far from six million horses and mules in the United States: and it is not too much to say that in a few generations these animals may be improved full $30 a head on an average. If so, then the gain by this increase of muscular power, and its greater durability, will be one hundred and eighty million dollars. If we study critically the machinery for converting grass, roots, and grain into beef and pork, the difference is

found to be still more striking. Let the *facts* relating to this subject be spread before the people, and great improvements will soon follow; and all classes will share equally in the profits of more productive labor.

The distribution of Seeds and Cuttings.

It is a law of nature, now fully recognized by men of science, that all cultivated plants and fruits, as well as all animals, are subject to constitutional deterioration, and are susceptible of organic improvement. Hence one thousand seeds of one variety of wheat, corn, cotton, or tobacco will produce a larger return, under equal advantages of climate, soil, and culture, than a like number of seeds of another variety.

Plants propagated by buds, like sugar-cane, potatoes, and fruit-trees, are peculiarly liable to constitutional weakness, and are less able than seedlings to endure rude treatment in violation of the laws of vegetable life. On many plantations the vital force of the sugar-cane is nearly exhausted: and this office is strongly urged to procure from countries where the plant is indigenous and grows from the seed, a new stock both of seeds and rattoons for the use of planters. In cultivating this tropical plant in districts bounding its zone on the north, much care and some science will be found highly useful.

Both seeds and cuttings of the best figs and olives grown on the coast of the Mediterranean should be procured through American consuls resident at the different cities on the borders of that sea. Figs and grapes, "oil and wine," will some day be numbered among the staples of the Southern States.

There is reason to believe that the most improved varieties of wheat grown in England and France would be a valuable acquisition to this country; and our wheat-growers would esteem it an especial favor if only a few bushels were procured for general distribution. With the small sum appropriated for the purpose, about eighty thousand packages of seeds have been put up and distributed, within the last three months. With a better organization and greater facilities for collecting seeds and cuttings, vastly more good might be done. There are now some two hundred thousand copies of agricultural papers and periodicals printed, which circulate more or less in every State in the Union. These are doing an invaluable service to the country. They cannot, however, enact laws for collecting annually reliable statistics of the results of labor and capital employed in Agriculture. Truthful statistics form the groundwork of all reforms—of all progress. State legislatures must aid in this great work. If "knowledge is power," ignorance is *weakness;* and the removal of this weakness is one of the highest duties of every republican government. Either the assessors or collectors of State and county taxes should be provided with blanks to collect useful information as well as money, from the people.

How Cities exhaust the fertility of Land.

There has been enough of the elements of bread and meat, wool and cotton, drawn from the surface of the earth, sent to London, and buried in the ground or washed into the Thames, to feed and clothe the entire population of the world for a century, under a wise system of agriculture and horticulture. Down to this day, great cities have ever been the worst desolaters of the earth. It is for this that they have been so frequently buried many feet beneath the rubbish of their idols of brick, stone, and mortar, to be exhumed in after ages by some antiquarian Layard. Their inhabitants violated the laws of nature which govern the health of man, and secure the enduring productiveness of the soil. How few comprehend the fact that it is only the elements of bread and meat evolved during the decomposition of some vegetable or animal substance that poison the air taken into human lungs, and the water that enters the human system in daily food and drink! These generate pestilence and bring millions prematurely to their graves!

Why should the precious atoms of potash which organized the starch in all the flour, meal, and potatoes consumed in the cities of the United States in the year 1850, be lost forever to the world? Can a man create a new atom of potash, or of phosphorus, when the supply fails in the soil, as fail it must under our present system of farm economy? Many a broad desert in Eastern Asia once gladdened the husbandman with golden harvests. While America is the only country on the globe where every human being has enough to eat, and millions are coming here for bread, how long shall we continue to impoverish ninety-nine acres in a hundred of all that we cultivate?

Both pestilence and famine are the offsprings of ignorance. Rural science is not a mere plaything for the amusement of grown up children. It is a new revelation of the wisdom and goodness of Providence—a humanizing power, which is destined to elevate man an immeasurable distance above his present condition. To achieve this result, the light of science must not be confined to colleges; it must enter and illuminate the dwelling of every farmer and mechanic. The knowledge of the few, no matter how profound or how brilliant, can never compensate for the loss incurred by neglecting to develop the intellects of the many. No government should be wanting in sympathy with the people, whether the object be the prevention of disease, the improvement of land, or the education of the masses. One per cent. of the money now annually lost by reason of popular ignorance will suffice to remove that ignorance.

I have the honor to be,

Very respectfully,

Your obedient servant,

DANIEL LEE.

HON. THOMAS EWBANK,

Commissioner of Patents.

I.

AGRICULTURAL STATISTICS.

The value of agricultural statistics depends on their general accuracy and being reliable for all business purposes. Wrong information as to the quantity of grain, tobacco, and other crops, annually grown, and mis-statements in reference to their market value, are calculated to mislead the unwary—tempting thousands to invest and sink their capital in uncalled-for and disastrous operations.

In the absence of a regular census, there is no way to determine, with any approach to accuracy, the amount of grain and provisions annually produced; and it is thought better to make no estimates at all, so far as the official returns are defective, than to fabricate statistics by mere guessing. The injury that results from this is not confined to the farming interest, but all dealers in and consumers of agricultural products are equally liable to sustain pecuniary loss by the public credit given to erroneous statements emanating from a department of the government. Whoever attempts to furnish statistics should bear in mind that, in the same degree in which *true* information is valuable, *false* information is injurious to the community. Certainly the great farming interest of the country has a right to exemption from harm, if government can do it no good.

The wheat crop of Michigan has been estimated at ten million bushels. The census of that State for 1849 gives the amount at four million seven hundred and thirty-nine thousand two hundred and ninety-nine bushels, showing an over-estimate of more than one hundred per cent. Instead of placing the value of the estimated ten million bushels at something like the worth of this crop to the producer, every bushel is set down at one dollar and fifteen cents, giving an aggregate of eleven million five hundred thousand dollars. Seventy cents are quite as much as the farmers of Michigan realized for their wheat in 1848; and, by correcting both the quantity and price, the figures are reduced to three million three hundred and seventeen thousand five hundred and nine dollars, or to nearly one-fourth of the sum said to have been obtained.

Hitherto no very definite objects appear to have been sought in collecting statistical information pertaining to rural affairs. In consequence of this lack of purpose, the means employed have been inadequate, except to accumulate a mass of figures for the truth of whose statements no one was responsible. Statistics, to be worthy of the name, must be founded on facts entitled to confidence. What evidence is there on which one may presume to name the tons of hay or bushels of grain grown in the State of New York in the year 1849? There is none whatever, nor has there been any since the State census of 1845. Why, then, waste time and paper in writing and printing crude guesses, in an official document, to mislead the public? Instead of repeating an operation which is believed to be worse than useless, a humble attempt will be made in this chapter to point out a few defects in the agricultural statistics of the country, and suggest such improvements as are most desirable and practicable.

If the question were asked, of what crop grown in the United States do the people export the largest amount in value, the answer would be, cotton; for it pays for nearly two-thirds of all the imports of the country. If an American statesman, merchant, or farmer were to ask, how many acres are planted in this crop, the answer must be: I cannot say, for in no cotton-growing State has a census ever been taken, either by the Federal Government or by its legislature, which gave the number of acres devoted to this staple.

Here is a most extraordinary omission, and one which has largely contributed to the unwise exhaustion of millions of acres of the best cotton lands in the world.

If the question were asked, how many acres are planted in tobacco? nobody can tell; for neither Congress nor any State government has deemed the matter of sufficient importance to ascertain the fact. No United States census has ever given information as to the number of acres sown in wheat, rye, barley, oats, hemp, flax, or peas, or planted in corn, potatoes, beans, or any other hoed crop.

If the questions were asked, how many sheep were shorn in 1840 to yield the thirty-five million eight hundred and two thousand one hundred and fourteen pounds of wool, and how many lambs were *not* counted as "sheep" in the nineteen million three hundred and eleven thousand three hundred and seventy-four enumerated, no one can answer. The fleeces clipped have never been counted; nor has any census given the number of cows milked in the United States. So far as reliable statistics are concerned, all our farming operations are conducted in midnight darkness. Nothing is so much needed as the annual record of trustworthy facts, extending over all the States, setting forth the productive power and value of both land and labor, when employed to the best advantage. So soon as this shall be done, whether by State Legislatures or Congress, it will be seen that the labor and soil of one farmer give twice as good returns for the benefit of himself and the community at large, as do the labor and soil of another, although the land of both may be alike productive. The returns procured through the medium of a few plain, simple questions, put by the assessors or collectors of taxes, would demonstrate the truth of the above remark; and, when demonstrated, those who fail to use their means to the best advantage will discover their errors and immediately change for the better.

So soon as legislatures shall be willing to promote improvements in tillage and husbandry, nothing is easier than to effect the desired object. Bring the practical results of the art, the science, and the energy devoted to agriculture often before the public, and the influence of thousands of good examples will tell powerfully in favor of universal advancement. Good and bad farming are now so blended that delinquents escape nearly all exposure; while such as do well are denied that distinction which is the just reward of merit. There is no resisting a legitimate argument, sustained by conceded facts. Mistakes in practice and errors in theory must give way before the light of truth; and *the truth alone* should be diligently sought, and widely disseminated among the farmers of the Republic.

When we shall be permitted to know the exact difference in the organic structure and productive value of the machinery which transforms grass, grain, roots, and other vegetable food into milk, meat, wool, and horseflesh, it will be seen that some domestic animals yield a profit ten times larger than others. There are samples of wool in the Patent Office, the product of a sheep that yields 18 lbs. of washed wool a year and weighs 420 lbs. This

mammoth sheep is the property of Colonel Josiah W. Ware, of Clarke county, Virginia, whose best fat wethers sell at thirty-five dollars a head.

In no branch of husbandry can greater or more profitable improvements be made than in wool-growing. Instead of importing so many millions of pounds of wool, in broadcloth, flannel, and raw material, American farmers should supply the home demand, and have a large surplus for export. It is much to be regretted that the census of 1850 will give no information as to the number of fleeces clipped in the United States. Without this knowledge it will be impossible to know what county or district gives the most wool per fleece.

The statistics of the dairy business are more defective than those pertaining to sheep-husbandry. The counting of cows in all the States is the first step toward their universal improvement; but this is yet to be taken. Previous to 1845, the number milked in the State of New York was not known; and it required some effort to persuade its legislature to have them counted. In that year, the number was nine hundred and ninety nine thousand, four hundred and ninety. This number (so near a million) attracted public attention to the production of butter and cheese, and the improvement of milch kine, in a remarkable degree.

To the New York State Agricultural Society, and especially to its indefatigable secretary, B. P. Johnson, Esq., great credit is due for successful efforts to advance this important interest. It is thought by those best informed on the subject that one million one hundred thousand cows in that State now yield an average return of twenty dollars a head. One of its best dairymen expresses the opinion, in the Transactions of the State Society for 1849, that the dairy products of that commonwealth will reach, at no distant day, fifty million dollars per annum. The business is rapidly extending in northern Ohio, and more or less as far south as Georgia. Excellent cheese, from two dairies in that State, were exhibited at the well attended State Fair held at Stone Mountain, in August, 1849. About sixty cows are milked in one of these dairies, and not far from one hundred in the other. Both are profitable, new cheese selling at from ten to fifteen cents a pound. The annual consumption of cheese at the South is increasing, and we know nothing that should prevent the farmers of Tennessee and other States in that quarter of the Union from producing enough for home consumption, if they make none to export. There are dairies in the State of New York which turn out six hundred pounds of good cheese per cow in a year; but from three hundred to four hundred pounds is a more common yield.

Intimately connected with the economical production of butter and cheese, is the art of making cheap *pork* for family use. For rearing pigs, buttermilk and whey are admirably adapted; but where hogs are to be grown in a large way, a different system is practiced. Clover, peas, and oats, fed off in the field by hogs, produce meat at a cheaper rate than it can be made on corn alone. According to the results attained by Mr. Ellsworth, late Commissioner of Patents, three and a half pounds of corn will form a pound of good pork; although most farmers give five pounds of corn for one of pork. Our statistics relating to the production of meat, whether beef, pork, veal, or mutton, are meagre and extremely defective. Very little science has been brought to the aid of American farmers either in the production or curing of provisions of any sort. In shipping perishable commodities of this kind to distant markets, and particularly to England, agriculturists in this country labor under many disadvantages. Much of the salt sold in

the United States is too impure to save meat, butter, and cheese well. From this defect alone, immense losses are sustained.

To compete with Englishmen in feeding people at their own doors, while Americans have to transport their breadstuffs and provisions from three to four thousand miles to reach the consumer, is obviously a hard business for our farmers. In the operation, their cultivated fields lose all that is exported, and receive nothing whatever in return. But independently of this, probably more than half the butter sent to England from this country is sold as *grease*, and at half the market price of a good article. This injures the reputation of all American butter, and diminishes the demand for it abroad. Equal complaint is made of the bad methods in which we cure and handle bacon for English consumption. Our export of pickled pork, bacon, lard, and live hogs, during the year ending June 30th, 1849, was nine millions two hundred and forty-five thousand eight hundred and eighty-five dollars. After making due allowance for every disadvantage, it is believed to be better farm economy to convert corn into pork and lard to send abroad, than to export the grain or meal. By thus saving all the manure which the corn will make, the expense of growing this crop, and consequently the cost of the pork and lard, may be reduced from twenty-five to fifty per cent. Ripe dry corn should be boiled, especially if it is not ground, before it is fed to swine, cattle, or sheep. And it will more than pay the expense to boil corn fed to working mules, horses, or oxen.

The statistics of the raw materials consumed and wasted in the production of every crop, and in the food of every animal kept on the farm, deserve to be studied with peculiar care. Few appreciate the immense loss sustained by first impoverishing arable lands, and then cultivating them in wheat, cotton, corn, grass, and other crops, with a poor return for the labor bestowed. In a national point of view, it is susceptible of demonstration that all labor which impairs the natural productiveness of the earth is worse than thrown away, no matter what the price paid for the products of such labor. We should ever bear in mind that the continued fruitfulness of the soil is above all price.

It may not be amiss to inquire what amount of the elements of bread and meat, cotton, tobacco, and other crops, is annually extracted from the surface of the earth in this country, and never restored to the fields whence it was taken. In answer to circulars issued from the Patent Office, several gentlemen at the South have stated that, to supply slaves on plantations with bread, including old and young, requires from twelve to thirteen bushels of corn each a year. Taking thirteen bushels as the average consumption, of the twenty-two millions of people in the United States, of breadstuffs, and the aggregate is two hundred and eighty-six million bushels per annum.

Without deeming it necessary to go into an explanation to prove why it is so, the fact may safely be assumed that the elements of fertility contained in all the meat, milk, butter, cheese, potatoes, fruit, and garden vegetables consumed by the American people, exceed by ten per cent. the amount which exists in the grain consumed. It is sufficient for my purpose, however, to place the estimate below ten per cent., and call the fertilizing elements contained in these articles of human food equal to three hundred and fourteen million bushels of corn. By adding together the sums above named, we have six hundred million bushels of corn, in effect taken from American soils, of which next to none is ever returned in night-soil or liquid manure.

The most intelligent wool-growers estimate the number of sheep now in the United States at thirty millions. In 1840, the number of swine was twenty-six millions three hundred and one thousand two hundred and ninety-three. At the usual rate of increase, their present number is not far from thirty-five millions. The number of neat cattle in 1840 was fourteen millions nine hundred and seventy-one thousand five hundred and eighty-six. Their present number should be about nineteen millions. At the last census, the number of horses and mules was four millions three hundred and thirty-five thousand six hundred and sixty-nine. Their present number approaches six millions. By estimating all the poultry as equal to ten millions of sheep (a low estimate), there are now in the United States one hundred millions of domestic animals, not to count goats and dogs, of which there are some millions. That these domestic animals draw their subsistence from the soil is plain enough; but to say what part of the elements of the food consumed is never restored to any improved land, is impossible. It is below the truth, in the judgment of the writer, to say that one-third of all the manure voided by the horses, mules, cattle, sheep, and swine in the United States is wasted. If so, the annual loss is more than equal to the production of two bushels of corn to each animal; or the aggregate exceeds two hundred million bushels.

We have now to estimate the annual loss incident to the production of the great staples of cotton, tobacco, sugar-cane, hemp, and flax, not to name smaller crops. Not far from ten millions of acres are annually planted in cotton, cane, tobacco, and hemp. It is a serious misfortune that the census of 1850 will throw no light whatever on either of these crops, so far as the area planted is concerned. Judging from our knowledge of the subject, we should prefer to have a field produce twenty bushels of corn per acre, and part with all the grain, retaining the stalks, blades, cobs, weeds, and grass, to renovate the land, to having it cultivated in cotton, tobacco, or hemp, in the usual way of growing these crops. The damage done to the ten millions of acres devoted to the culture of these staples is equal to the growth and exportation of two hundred million bushels of corn a year. While we have said nothing of the breadstuffs and provisions actually sent out of the country, and have conceded that two-thirds of all the liquid and solid excretions of all domestic animals are saved and turned to a profitable account—a statement which few farmers familiar with the husbandry of many States will endorse—yet the aggregate loss is equal to the production of one thousand million bushels of corn, or of half that quantity of wheat.

It may be said that this prodigious annual waste of the raw material for making human food and raiment is a matter of no practical consequence; and that each cubic foot of soil contains an unlimited amount of the precise things which nature consumes in forming cotton, wheat, corn, tobacco, sugar-cane, and other cultivated plants. This is the popular opinion, and the practice of American agriculture is based on this mistaken theory. Those farmers who do most to impoverish their cultivated fields are the greatest *theorists* in the country. It is so much easier to adopt a ready-made theory, handed down from one's father and grandfather, than to study the several substances in a soil required to give a generous harvest, that ninety-nine in a hundred adopt the former course. How few agriculturists have any clear knowledge of the quantity of any essential element of wheat or corn available to the growing plant, which any given amount of his soil contains! The atoms that form the crop, whether in the earth, or in the atmosphere, are rarely studied by practical farmers. Every cultivated plant contains an appreciable amount of potash and phosphorus—not to name other minerals drawn from the soil. Without some alkali and phosphoric acid, no one has ever succeeded in producing the seed of any cereal plant. Nor can a cotton, potatoe, or tobacco plant be grown to maturity without these soluble earthy salts, which appear as *ashes* when such plants are carefully burnt. If a farmer were to ask the price of phosphorus at any shop that deals in the article, he would find that it is worth from two to three dollars a pound. The phosphorus of commerce is mostly obtained from the bones of domestic animals.

The high market price of this substance proves its scarcity. There are few soils which contain, in an available form, so much as one part of phosphoric acid, or one of potash in a thousand; and yet, in the plenitude of our national folly, we annually throw away in our cities, villages, and on our farms, enough of potash and phosphorus to make five hundred million bushels of wheat, or twice that quantity of corn! Let the agriculturists who are troubled to raise good crops of wheat, remember that not far from eighty per cent. of the incombustible earthy matter consumed by nature in forming the seeds of this plant, are *potash* and *phosphoric acid*.

When will Congress or some State Legislature appropriate the small sum of one thousand dollars, needed to demonstrate in a practical way *the cost of making a new soil*, equal in potash, soda, magnesia, lime, chlorine, soluble silica, phosphorus, sulphur, nitrogen, and carbon, in the condition of mould, to a fair virgin earth, before the work of exhaustion begins?

Statistics of this kind would be invaluable to the whole country. Of course, the renovation of land can be effected much cheaper in some localities than in others; but the critical study of the subject, with reliable weights and measures, both of raw material consumed and product, at one place, would throw much light on one of the most important problems in the art and science of agriculture.

How much of the earthy elements of crops can an acre of tilled land part with every year, and not diminish in fertility? This is a question of fact, not one of theory; and who among the three millions of farmers in the United States can answer it?

So soon as the American people can be persuaded to study Agricultural Statistics as a science, the surplus of the elements of bread and meat, wool and cotton, which really exists in some soils, will be carefully husbanded, and applied in the most economical manner to such as lack in that regard. In this way, every acre having a climate congenial to the purpose can be made to yield a bale of cotton a year, or sixty bushels of corn, or twenty-five of wheat.

No department of husbandry is more interesting to the thoughtful farmer, or more promising of auspicious results, than the careful study of fertilizers. But we are sorry to say that no State in the Union has regarded statistics on this subject as worth the trouble of collecting. In several of the planting States, cotton seed is much used as a manure, and it is very desirable to know how many additional bushels of wheat or corn one thousand bushels of cotton seed ought to give the skillful agriculturist. We have reason to believe that one planter realizes twice the benefit from this exceedingly valuable fertilizer that is obtained by another. Similar remarks will apply to the manure derived from the consumption of one hundred or one thousand bushels of corn, where the whole matter voided is carefully preserved from loss

The essential facts pertaining to the feeding both of plants and animals are permitted, to remain in lamentable obscurity. Why should a farmer, who has a quantity of stable or yard manure to haul to a distant field, be compelled to carry out eighty-five loads of simple water in every one hundred of this valuable fertilizer? It is rare indeed that barnyard manure contains less than eighty per cent. of water, and it often has eighty-eight per cent. Is there no way to avoid this obvious loss of labor? As one hundred pounds of guano (the dung of sea-birds) frequently produce five hundred of corn, or three hundred of wheat, why may not similar elements of crops, in the excretions of all domestic animals, be alike concentrated, and drilled in with the seed, or scattered broadcast over the land? Why throw away more solid, hard work on one hundred million acres, than all the mechanics and manufacturers in the country perform, in an attempt as foolish as to carry freight in knapsacks, and travel on foot in competition with modern rail-roads? If one hundred pounds of the best guano is better to augment a crop of grain than a like weight of common loam, or stable manure, there must be a reason *why this is so*. What is this reason? We can only give a few hints; and in the first place, let the reader consider well the fact, that in one hundred pounds of wheat there are ninety-five of the elements of water, and charcoal, called carbon.

Now, wheat plants are not wholly dependent on the mould in the soil for carbon and the elements of water; and the farmer should take advantage of this fact. The other five parts in one hundred of wheat being organized nitrogen, and the incombustible part of the seed, are less abundant, in an available condition; and these lacking ingredients must be supplied by the husbandman. Of these elements guano really contains, when pure, and the dung of pigeons also contains, more than any other product of nature. Hence, when estimated in pounds, the dry excrements of birds are more valuable than those of cattle, or of man even, although the man, the ox, and the bird may each consume corn or wheat. There is reason to believe that when birds eat two hundred ounces of wheat, their excretions dried will weigh about the same as those of a man or pig formed by half that quantity of wheat, provided neither animal nor bird gains or loses in weight. The solid excretions of a horse, and, so far as is known, of all quadrupeds, by the bowels and kidneys, are about forty per cent. of the food consumed.

The other sixty parts in one hundred escape from the system mostly as carbonic acid and vapor given off in breathing. In birds, the weight of the matter which escapes through their lungs is some eighty per cent., and the guano about twenty per cent. If this estimate approximates the truth, then a pigeon must consume five hundred grains in weight of wheat or worms to form one hundred of dry dung; and, if nature is true to herself, the fertilizer derived from five hundred grains of wheat should reproduce the amount consumed. The essential truth in this matter is, that so much of the elements of animal food as escape into the atmosphere by respiration and insensible perspiration, may safely be dispensed with in feeding cultivated plants. The matter that escapes is mainly the elements of water and carbonic acid. Although organized carbon, oxygen, and hydrogen are far from being valueless as manure, they are not so indispensable to be artificially applied as ammonia and salts of potash, lime, and magnesia. Much the larger portion of the food of animals, taken into the stomach, is absorbed and passes into the blood-vessels.

If any one branch of farm statistics is more important than the others, it is that which relates to the skillful production and use of manure. Few

are aware how much labor and money are lost by popular ignorance on this subject. Boussingault fed a horse which neither gained nor lost weight, with twenty pounds of hay, six pounds of oats, and forty-two pounds of water a-day. In the food consumed, there were twenty-two pounds six ounces of perfectly dry matter. The dung and urine voided in twenty-four hours, when equally dried, weighed ten pounds three ounces, showing a loss by breathing and insensible perspiration of twelve pounds three ounces. In the hay and oats, there were ten pounds six ounces of carbon (charcoal); in the excrements, only three pounds eleven ounces seven pennyweights; being a loss of nearly seventy per cent.

In the food, there were eight pounds seven ounces two pennyweights of oxygen (vital air); in the excrements, only three pounds seven ounces sixteen pennyweights. The loss in weight of hydrogen (it existing in the food as one to eight of oxygen) was in about the same proportion. There were four ounces nine pennyweights of azote (nitrogen) in the food, of which three ounces fourteen pennyweights appeared in the dung and urine. Of earthy salts, there were one pound six ounces ten pennyweights in the hay and oats; in the excretions, one pound six ounces two pennyweights.

The critical study of the above data will show that one hundred pounds of hay and oats yield about forty pounds of dry manure. It is known that manure heats, ferments, rots, and loses weight. This chemical operation can be so conducted as to reduce the weight one half, without essentially or equally reducing its fertilizing power.

If a pound of ammonia, phosphates of potash, soda, lime, and magnesia, is worth as much in night-soil as in imported guano, then there is no need whatever of importing manure from Peru and Africa. We learn from dealers in the article, that some sixty thousand dollars are paid for Peruvian guano a year in the District of Columbia alone. Not only can this sum of money be saved, but guano equal to, and identical with, the Peruvian, can be manufactured and sold in the city of Washington at half the price of the imported article, at a fair profit. There is not an element in guano which does not exist in bread and meat; and taking the market value of this dung of sea-birds as the standard (fifty dollars a ton), and the fertilizers annually wasted in this city (Washington) are worth one hundred and fifty thousand dollars. If Congress will give the agricultural department of the Patent Office five hundred dollars to test this matter in a practical way, the best method of preparing poudrette can be published in the next annual report from this office, and will be received with great satisfaction by the farmers of every State in the Union. It is no reflection on American agriculturists to say, that the science of preparing manures is little understood; for we have no agricultural schools in the country, and neither Congress nor any State Legislature has given a dollar to foster the scientific investigation of fertilizers.

Some may say that this subject has nothing to do with agricultural statistics, and that no facts but such as relate to the quantity and value of crops and other products of rural industry should be discussed under this head. But how is one to know the value of the hay and grain, grass and roots made and consumed on a farm, without regard to the meat, wool, butter, cheese, horses, mules, and *manure*, into which these crops are converted?

II.

A GENERAL VIEW OF AMERICAN AGRICULTURE.

CHAPTER I.

The Position of American Farmers.

EVERY one that eats bread or wears cloth made of wool, cotton, or flax, has a direct personal interest in the results of tillage and farm economy. Hunger and nakedness are wants of the most pressing character; and Providence has placed them alike in every human being. In civilized communities, all are equally dependent on successful agriculture for the means of subsistence. Let the soil be permanently exhausted, or fail but for a year to reward the labor of the husbandman, and no language can adequately describe the intensity of the universal suffering that must ensue. Hence this branch of national industry has peculiar and paramount claims to the earnest attention and the fostering care of all governments which are regardful of the public safety, and sustained by common sense.

American agriculture offers for consideration several interesting and striking features: prominent among these is the fact that nearly three-fourths of the labor and capital of the country are employed in this single pursuit. Agriculturists are themselves a large majority of the voters, tax-payers, and consumers of all domestic and foreign goods.

Under our republican system, they are mainly responsible for the good government of each State, and of the Union. If their public servants, whether in Congress or State Legislatures, fail to promote improvements in agriculture, as recommended by President Washington, the fault is not in their representatives, but in those who neglect to ask for such aid as Government may properly grant.

American farmers enjoy advantages superior to those of all other nations for improving both themselves as a class, and their landed estates, up to the highest capabilities of man, and of the earth which he cultivates. This Republic proffers to rural art and rural science more than one thousand millions of acres of available farming lands; of which as little, or as much may be subdued and improved as wisdom shall dictate. There is neither compulsion nor restraint in either direction. With this entire freedom of action is associated a degree of security for life, liberty, property, toleration of religion and exemption from onerous taxes, without a parallel in the history of the world. In extent of sea coast, facilities for river, lake, and canal navigation; in variety of climate, soil, vegetable and animal products; in indefinite and almost unlimited commercial, manufacturing, mineral, and hydraulic resources, no other country equals this. There is some danger, however, that we shall prove unworthy of so great blessings—that we may forget the source whence they come, abuse the peculiar advantages and exalted privileges which we possess, and blindly cling to the barbarous practice of impoverishing the soil, to the incalculable injury of coming generations.

Instead of exhausting millions of acres without any adequate recompense, instead of looking longingly toward the wilderness of forest and prairie at the west, we should search closely into the lands already under the plough, and learn what can be done to add two, three, and fourfold to their present productiveness. The time has at last arrived when it is indispensable to the continued prosperity of all the older States that the principles both of renovating and exhausting cultivated fields be thoroughly and universally understood.

A few Facts about Soils.

Soils contain, as a general thing, not more than one part in a thousand of the atoms, in an available condition which nature consumes in forming a crop of any kind. This statement expresses a fact of great practical importance; for the husbanding of these fertilizing atoms is the first step toward arresting the impoverishment of the earth. It is the matter in the soil which makes crops in one arrangement of its atoms, and forms manure in another condition of the same atoms, that the farmer should learn to preserve from waste and loss.

Soils of different degrees of productiveness, where their mechanical texture and physical properties are alike, always contain unlike quantities of the food of crops. It seems to make little difference how small is the amount of the lacking ingredient in the composition of cultivated plants. Its absence is fatal to the farther growth of the crop after its appropriate aliment fails in the soil. It is easy to discover the wisdom of this universal law. Suppose nature should organize grass, grain, and other plants which serve as the daily food of all the higher orders of animals, as well without bone-earth (phosphate of lime) as with that mineral—would it be possible for such grass and grain to yield to the blood of domestic animals, and of man himself, that solid earthy matter which imparts strength to human bones, and to those of oxen, horses, sheep, and swine? Certainly not. Although *iron* is always present in the food and blood of animals, no farmer ever killed a calf, a pig, or an ox, which had iron for the frame of its system. No anatomist ever saw a bone in the body of a person formed of other earthy atoms than such as Providence had fitted for that peculiar function in the animal economy.

The brains and muscles of all animals contain both sulphur and phosphorus, as constituent elements. If their daily food, derived as it is from the soil, lacked either sulphur or phosphorus, must not this radical defect in their nourishment soon induce weakness and disease, and finally result in premature death? To prevent consequences so disastrous and so obvious, nature refuses to organize plants without the presence in the soil, *in an available form*, of those peculiar atoms adapted alike to the wants of vegetable and animal vitality. This wise provision should be carefully studied by every one who desires to enjoy sound health and a long and happy life. Most of "the ills that flesh is heir to," as well as most maladies of plants, have their origin in the violation of nature's laws.

The growth and constitutional vigor of all living beings, not less than the revolution of the earth on its axis, are governed by immutable laws. One of these appears to be that an atom of carbon (charcoal) shall not perform the function of an atom of iron; nor can an atom of iron perform the office of an atom of carbon, or that of any other element concerned in the organism of plants and animals.

There are only some fifteen kinds of elementary bodies used by nature in forming every vegetable and animal substance, produced on the farm, in the orchard, or in the garden.

The science of rural economy consists in the systematic study of atoms, and of the laws by which they are governed, whether they exist in solid or crumbling rocks, in loose earths, in vegetable or animal mould, in fermenting manure, in the living tissues and cells of organized beings, or in the form of invisible gases diffused through the atmosphere. Every product of agricultural labor is either a vegetable or an animal substance; and in its production, not an atom of new matter is called into existence; nor is it possible to annihilate an atom when it decays.

In the language of science, all matter which is neither vegetable nor animal, including air and water, is *mineral.* All minerals are either solids, like sand, clay, and lime; or liquids like water, or gases like common air. The farmer deals largely with atoms in each of these forms; and hence he should be familiar with the several sciences which treat of the natural phenomena witnessed in the mineral, vegetable, and animal kingdoms. He should know that plants alone subsist on mineral or disorganized food—that if there were no plants in the ocean nor on the land, neither marine nor land animals could have a being. In the absence of all vegetation, it is obvious that all animals must be carnivorous, or cease to consume organised aliment. Being wholly dependent on mutual destruction for the means of subsistence, every day would diminish the aggregate supply of food, and the last animal would soon die of starvation.

From the above reasoning, it is plain that vegetable life is older on this planet than animal life; and that plants may have flourished thousands of years before the lowest type of being which depended wholly on organised food for subsistence, was created. It will also be seen that the line of demarkation between animals and plants is well defined, by the fact that the latter can organize the elements of all vegetable and animal substances into compound bodies, which the former cannot do. All plants produce and increase organized matter; all animals consume and diminish the quantity of organized food.*

CHAPTER II.

What the Country has lost by Impoverishing its Soils.

TAKING the census of 1840 as the basis of the calculation, and adding no more than the usual increase, including immigrants, the number now employed in agriculture in the United States does not vary much from five millions. The number of acres which they cultivate is not known. In the State of New York, there are some twelve million acres of improved land, which includes all meadows and enclosed pastures. This area employs about five hundred thousand laborers; being an average of twenty-four acres to the hand. At this ratio, the number of acres of improved land in the United States is one hundred and twenty millions. But New York is an

* See Dumas' Balance of Organic Nature.

old and more densely populated State than an average in the Union; and probably twenty-five acres per head is a juster estimate for the whole country. At this rate, the aggregate is one hundred and twenty-five millions. Of these improved lands, it is confidently believed that at least four-fifths are now suffering deterioration in a greater or less degree.

The fertility of some, particularly in the planting States, is passing rapidly away; in others the progress of exhaustion is so slow as hardly to be observed by the cultivators themselves. To keep within the truth, the annual income from the soil may be said to be diminished ten cents an acre, on one hundred million acres, or four-fifths of the whole.

This loss of income is ten millions of dollars, and equal to sinking a capital of one hundred and sixty-six million six hundred and sixty-six thousand dollars a year, paying six per cent. annual interest. That improved farming lands may justly be regarded as capital and a fair investment when paying six per cent. interest, and perfectly safe, no one will deny. This deterioration is not unavoidable, for thousands of skillful farmers have taken fields, poor in point of natural productiveness, and, instead of diminishing their fertility, have added ten cents an acre to their annual income, over and above all expenses. If this wise and improving system of rotation tillage and husbandry were universally adopted, or applied to the one hundred million acres now being exhausted, it would be equivalent to creating each year an additional capital of one hundred and sixty-six million six hundred and sixty-six thousand dollars, and placing it in permanent real estate, where it would pay six per cent. annual interest. For all practical purposes, the difference between the two systems is three hundred and thirty-three million three hundred and thirty-three thousand dollars a year, to the country.

There is another view of this important subject which is worthy of profound consideration. Of the twelve million acres of improved land in the State of New York, one million are so cultivated as to become richer from year to year. These improving soils are in the hands of forty thousand cultivators, who take and read agricultural journals, and nobly sustain the State and county societies of that commonwealth.

Three million acres of the twelve millions are so managed as barely to hold their own in point of fertility. These lands belong to a class of farmers who do as well as they know from personal observation, and seeing how reading men improve their estates and domestic animals.

Eight million acres are in the hands of three hundred thousand persons, who still adhere to the colonial practice of extracting from the virgin soil all it will yield, so long as it will pay expenses to crop it, and then leave it in a thin poor pasture for a term of years. Some of these impoverished farms, which, seventy-five years ago, produced from twenty to thirty bushels of wheat on an average per acre, now yield only from five to eight bushels. In an exceedingly interesting work entitled "American Husbandry," published in London in 1775, and written by an American, the following remarks may be found on page 98, vol. i. "Wheat in many parts of the province (New York) yields a larger produce than is common in England. Upon good lands about Albany, where the climate is the coldest in the country, they sow two bushels and better upon an acre, and reap from *twenty* to *forty*; the latter quantity, however, is not often had, but from twenty to *thirty are common*; and with such bad husbandry as would not yield the like in Eng-

land, and much less in Scotland. This is owing to the *richness* and *freshness* of the land."*

According to the State census of 1845, Albany county now produces only seven and a half bushels of wheat per acre, although its farmers are on tide water and near the capital of the State, with a good home market, and possess every facility for procuring the most valuable fertilizers. Dutchess county, also on the Hudson River, produces an average of only five bushels per acre; Columbia six bushels; Rensselaer eight; Westchester seven; which is higher than the average of soils that once gave a return larger than the wheat lands of England even with "bad husbandry."

Fully to renovate the eight million acres of partially exhausted lands in the State of New York, will cost at least an average of twelve dollars and a half per acre, or an aggregate of one hundred million dollars. It is not an easy task to replace all the bone-earth, potash, sulphur, magnesia, and organized nitrogen in mould consumed in a field which has been unwisely cultivated fifty or seventy-five years. Phosphorus is not an abundant mineral anywhere, and his *sub-soil* is about the only resource of the husbandman, after his surface soil has lost most of its phosphates. The three hundred thousand persons that cultivate these eight million acres of impoverished soils annually produce less by twenty-five dollars each than they would if the land had not been injured.

The aggregate of this loss to the State and the world is seven million five hundred thousand dollars per annum, or more than seven per cent. interest on what it will cost to renovate the deteriorated soils. There is no possible escape from this oppressive tax on labor of seven million five hundred thousand dollars, but to improve the land, or run off and leave it.

That the latter has been done to a large extent is shown by comparing the population in rural districts, at the census of 1830, with that of 1840. In nearly half the towns in the State, population had decreased notwithstanding the rapid growth of cities and villages, demanding an increase of farm laborers to supply the more local markets. The canals of New York have operated to hasten the exhaustion of its arable lands; just as a railroad to California would aid in extracting gold dust from its now unwashed sands. While the canals and railroads of New York convey a thousand tons of the few *precious atoms* in the surface of the earth which can alone form bread and meat, to tide water, they do not carry back from tide water one ton of the raw material for making crops of any kind. A million tons of human food pass down the Mississippi, where one ton of the elements of such food ascends the "father of waters."

It will be seen, on referring to the census of 1840, that the five States of Maryland, Virginia, North and South Carolina, and Georgia, employed at that time one million thirteen thousand four hundred and sixty-three persons in agriculture. Of this number Maryland had sixty-nine thousand eight hundred and fifty-one; Virginia three hundred and eighteen thousand seven hundred and seventy-one; North Carolina two hundred and seventeen thousand and ninety-five; South Carolina one hundred and ninety-eight thousand three hundred and sixty-three; and Georgia two hundred and nine thousand three hundred and eighty-three.

It is a statistical question of considerable importance, to determine how much less these laborers, and the mules, horses, and oxen which they work,

annually produce, than they would, had no acre of arable lands in these States, so highly favored by climate and fertility, been damaged in the least by improper tillage. The difference in the cost of making crops on poor land and on good land is much greater than is generally supposed. The shrewd farmers of Massachusetts prefer giving sixty cents a bushel for western corn rather than grow this grain on their less fertile soils; while the corn-growers of Indiana and Illinois are glad to sell their crops made on rich land at twenty cents a bushel. From these facts, is not the inference plain and satisfactory, that it costs three times more to produce a bushel of corn on *poor* than on *rich* land? To do full justice to this interesting problem, by what means and to what extent the soils of the five States above named have been injured, would fill a volume.

A residence of more than two years in the most southern of these States, connected with its agricultural press, and devoting much time to the study of soils and their products, warrants the writer in expressing an opinion on the weight of evidence collected from all sources within his reach. The annual loss on the labor of each hand and mule is believed to be thirty dollars. This estimate is too high for some plantations and too low for others. The only reason why so many slaves have been sent south during the last twenty-five years (and thousands out of Georgia) is, that the labor of a person is worth twice as much to cultivate rich, fresh land, as poor, old land. If the estimate of a yearly loss of thirty dollars on each hand and the domestic animals which he works be not too high, then the aggregate exceeds *thirty millions of dollars*.

This is equivalent to having sunk a productive capital invested in farming lands at a cheap rate, *of five hundred millions of dollars*, yielding six per cent. annual interest. While England and France have derived hundreds of millions in profit and revenue, from the tobacco and cotton exported from Georgia, the Carolinas, Virginia, and Maryland, a large share of all the proceeds received from these staples, which have so desolated the earth over immense districts, has left these old impoverished States, with their emigrating citizens, never to return.

This unwise system of tillage is extending rapidly in the United States. Manufacturers, merchants, and mechanics often shift their settled policy, when they see a profit in making a change. But whoever expects millions of isolated farmers to change suddenly their practices, ideas, and systems of culture and husbandry, shows that he has not labored twenty years to substitute an improving for an exhausting system of field culture. At a fair estimate, there are at this time two million seven hundred and forty-one thousand nine hundred and sixty-six persons employed in agriculture in the fifteen slave-holding States. Before the study of rural economy as a science will become as popular as the study of politics, law, and medicine, the South will have at work in the field a force of five millions of operatives. Who does not see that the wise and skillful employment of this vast power of production is a matter of inestimable consequence to all the planting States and to unborn millions who must dig their daily bread from impoverished soils, if the mighty work of land exhaustion is to increase and extend as population spreads over the cotton, tobacco, and sugar-growing portions of the Union? Propagated by buds instead of seeds, the sugar-cane will be found, like the potato plant, less able to withstand the customary abuses of nature's laws than tobacco, corn, wheat, and cotton plants. But all these are suffering in vital force and constitutional vigor by reason of their defect-

ive food in partially exhausted soils. Any living being may habitually take a very little poison into its system without destroying life. Pursue the practice of poisoning only to a very small degree, and it will tell in the course of a few generations in strange, new, and incomprehensible maladies. An instructive and useful book might be written on the diseases of cultivated plants; to say nothing of those of domestic animals. Mildew, mould in cheese, rust on wheat and cotton, and the fungi believed by naturalists and botanists to be so injurious to potatoes, are all in a good degree, like other vegetable creations, subject to the control of human industry and science.

If we visit the farmers of the North West, we shall find the popular feeling developing itself after this fashion: "Let us construct railroads and canals, improve our navigable rivers and lake harbors, purchase the best farm implements, and then employ all our capital and energies in transforming every atom in the soil which will make grain, provisions, and wool, into these marketable commodities, and send them to distant cities and nations for consumption."

This agricultural and commercial enterprise is complacently regarded as the proper development of the agricultural resources of a new country. Although the inevitable results of this practice may be seen in each of the old thirteen States, as in the valleys of the Mohawk and Hudson, yet it is confidently believed by sanguine farmers that the truly rich soils of the west are inexhaustible. Whoever will carefully examine this great national question, of taking everything out of the land and putting nothing back, must be satisfied that no other than the most disastrous consequences can follow. The number of laborers employed in this simple operation increases at the rate of two hundred thousand a year, in the United States.

CHAPTER III.

By what Processes the Earth is impoverished.

There are three principal ways in which the natural fruitfulness of the earth may be seriously impaired.

1. By removing its natural products: as when a prairie is annually mown for a series of years, and all the hay removed, and no manure or other fertilizer returned. In Europe, where forest culture is practiced, experience has shown that to remove the leaves that annually fall upon the ground to rot and form mould over the roots of trees, is sure to impoverish the land and injure its valuable products. These leaves, as well as prairie grass, contain both earthy minerals called *inorganic* matter, and combustible elements usually designated by the term *organic* matter. In burning over prairies, the latter portion of the plants consumed is alone removed from the soil; their *ashes* remain on the ground where the plants grew. Pastures are deteriorated by the loss of the grass carried off in the stomachs of domestic animals.

2. Soils are impoverished by tillage without cropping, or removing any plant whatever. No fact in agriculture is more important than this: All tillage is purely an artificial and withal a most unnatural operation. Nature never ploughs, nor harrows, nor hoes the earth to promote the growth of vegetation. Her highest productiveness is the result of laws, which every

farmer should carefully study and learn to follow, in the renovation of cultivated fields.

Although all tillage is a mechanical process, yet its effects are both chemical and physical on the soil. So far as the chemical results of tillage are concerned, they are quite independent of all crops and other plants. It is not so easy a task as some may suppose to explain, in a few plain words, the several changes wrought in the mould and inorganic part of soils, by the plough, spade, and hoe. The mechanical and physical effects of tillage are very obvious to every cultivator. The earth is *mellowed*—rendered exceedingly porous and admirably fitted not only to absorb atmospheric air, and all gaseous bodies, but to *condense* them in the innumerable pores of the friable mass. The same causes which increase the fertility of a fallowed field exhaust the soil, if long continued, although no crop should be grown upon it. If, however, a crop of weeds, grass, peas, or clover be grown and allowed to die and rot on the ground or be ploughed in, the soil will be enriched by the operation. But if a field be annually ploughed and hoed, as for a crop of corn, tobacco, cotton, or sugar-cane for twenty-five years, and no plant whatever be allowed to grow on its surface, the mechanical and chemical changes, associated as they must be with the leachings and washings of innumerable rains, would result in removing from the surface of the earth nearly or quite all of its vegetable mould and the soluble mineral food of plants. To test this principle in nature, suppose a farmer were to apply twenty-five loads of well rotted stable manure upon an acre of land, and plough, harrow, and hoe the ground twenty-five years, as for crops of corn or cotton, but plant nothing and permit neither grass nor weeds to grow thereon. Would any of the dissolved elements of this manure remain that length of time in the surface soil? Certainly not. If manure will decompose and disappear like wood consumed in a fire-place, may not vegetable mould do so likewise? And if the mineral known as common salt and salts of lime and potash will readily dissolve on the ground in rain water, and pass in a state of solution deep into the earth and re-appear in springs, wells, and rivulets, may not similar minerals naturally in the soil, and rendered soluble by tillage, be also dissolved and washed out of the mellow ground into the compact sub-soil, or into swamps, rivers, and the ocean?

The principal object of ploughing and hoeing is to increase the quantity of available food for the crop; but while the plants are present in the soil and growing, it is by no means certain that all the manure or other fertilisers applied to the land, or all the elements of the crop naturally in the soil, enter the roots of cultivated plants, and appear at the harvest.

Under certain circumstances, the loss by leaching and solar influences is very large. In producing small crops of corn, cotton, wheat, and other plants, the waste of raw material is far greater in proportion to the harvest, than in large crops whose roots and foliage cover the surface both in and above the soil universally. Small corn or cotton plants, and these quite distant one from another, greatly favor the volatilization of all volatile substances and the washing away of all soluble elements.

3. *Tillage and cropping* exhaust land faster than it can be done in any other way short of carting off the surface soil in a mass. The degree of injury inflicted by this operation is very variable: not only on different fields, and soils, but on the same surface at different times and seasons. A light, open, sandy soil that has no clay foundation will not bear ploughing

and cropping so long, with so small deterioration, as the same soil with a clay sub-soil. Light, sandy soils abound in North Carolina, Virginia, Maryland, Georgia, and South Carolina, and most of these when fresh yield fair crops. Their red clay lands are not so easily worked, but are more enduring and generally more productive.

The limestone soils of the Cherokee country, of Tennessee, Kentucky, Missouri, and other States, are altogether different from any formed from the *debris* of granitic, metamorphic, and sand rocks. It is impossible to form an intelligent opinion of the exhaustion of a soil by any given amount of tillage and cropping, without knowing something of the *parent rocks* from which the earth was derived, and something of its physical and chemical properties. A knowledge of the principles of geology and chemistry is invaluable to one who desires to understand in advance what are the natural capabilities of any arable land; and what elements of crops it is most likely to have in too small a quantity.

It often happens that a soil partakes very little of the character of the rock that lies but twenty or thirty inches below its surface.

This is owing to the circumstance that a different kind of rock has furnished the earthy matter deposited above the solid strata. In several counties in Western New York, the soft Medina sandstone has been comminuted and carried by tidal currents, glaciers, icebergs, or some other moving force, many miles southward, and spread over lime-rocks, hundreds of feet higher than the parent sandstone, both geologically and topographically. Although resting on lime-rock, these soils often lack lime to a degree.

The durability of a soil is governed, in an eminent degree, by its texture and hygrometric properties.

Tenacious clay lands retain fertilizing salts with peculiar and remarkable affinity. When well drained and thoroughly tilled, they yield up their nutritive constituents as fast as is profitable. Where one has but a small surface to operate on, the application of clay to sandy soils is very useful. The deeper and more thoroughly one cultivates his land, removes all that it produces, and makes no adequate restitution, the faster will he impair the natural capabilities of his soil. No matter with what skill and science a farmer extracts immense crops from his fields; the larger the amount of potash, soda, magnesia, soluble flint, phosphorus, sulphur, chlorine, and organized nitrogen, carried off in crops, the poorer his land must become, unless a part of all these ingredients be returned to the earth whence they were taken.

It is impossible to say, with any approximation to the truth, in the present infancy of agricultural science, how much of the inorganic food of plants may be safely removed from year to year in grass, milk, meat, or grain, in cotton or tobacco, from an acre of common fair land, without detriment. A little of dissolved sand, lime, potash, magnesia, sulphur, mould, and phosphorus may be spared from the poorest soils, without injury; while some so abound in the elements of crops as to furnish an amount twenty times larger, without exhausting the supply of earthy minerals. This point will be farther discussed in the next chapter.

CHAPTER IV.

What is the available Capacity of the Farming Lands in the United States to feed and clothe the Human Family?

No question, either in rural or political economy, is more important than the above. What the soil can do, and what it cannot do, are questions of fact, about which every American citizen should be well informed.* That the principal wealth of the United States lies in its vast agricultural capabilities, is apparent to all; but this general appreciation of an important truth fails to impart to the understanding any definite idea of the capacity of any given farm to produce grain, cotton, or provisions, by any system of tillage and cropping.

As it is a law of nature that mankind shall increase in numbers, and consume a corresponding increase of food and raiment, it is obvious that no system of agriculture that does not improve the soil *a little* in the lapse of ten or twenty years, can be a wise system for the community at large. Nor is it, upon the whole, of any advantage to a farmer or planter, to work up the raw material of cultivated plants in a virgin soil, in the course of a few years, and then abandon his exhausted fields and clear new ones.

That fortunes have been realized by operations of this kind, is not denied; but no planter who has followed this popular practice has made more money thereby than he might have done by so cultivating the soil as to increase, instead of diminishing, its natural fertility. It may be conceded that his fresh lands cost him not over three or five dollars an acre; and that, after one thousand acres have been so impoverished as not to pay a profit on their cultivation, another thousand acres may be had at the cost of the first; still it can be shown, both by practice and theory, that less profit is attainable by this course than by a system of planting founded on scientific principles.

If the cultivator had to apply to his soil one hundred pounds of manure or other fertilizing matter, for every one hundred pounds harvested and removed in the crop, then to wear out the virgin earth would give one vastly more ready cash than to attempt to feed plants with all the atoms consumed in their growth. Fortunately, no such necessity exists. In the wise economy of nature, it is not probable that more than an average of one pound in ten of the dry weight of cultivated plants, including their roots, stems, leaves, and seeds, is formed of matter which existed as a part of the solid substance of the soil in which the plants grew. Several experiments have been made by the writer for the purpose of determining what percentage of wheat, corn, and potatoe crops is composed of atoms derived from mould, silica (sand), lime, potash, &c., extracted from the soil; and what part was derived from water, carbonic acid, and other gaseous elements known to exist in

* We greatly need additional experiments to test in a reliable manner both the natural capabilities of soils and the productive power of different fertilizers. The simple fact that three hundred pounds of guano often give a gain of twelve hundred pounds in corn and six hundred in wheat crops is full of promise in favor of concentrating manures. In hauling out one hundred loads of barn-yard manure, the farmer carries on an average eighty loads of water. Water is often very valuable, but it will hardly pay to haul it half a mile or more, in a cart or wagon, to irrigate a field. The great weight and bulk of manure must be got rid of, without impairing its productive power.

the atmosphere. Wishing to repeat these researches on a larger scale before publishing, no account of them has been made public.

The science of feeding plants is in its infancy; and very little public encouragement has been held out to any one to devote his time and money to investigations of this character. The little attention paid to the feeding of wheat in England has resulted in raising the average product from sixteen to thirty-two bushels per acre. If a small share of the talent and public patronage of this country could be turned to the study of vegetable and animal physiology in their connection with farm economy, and to chemistry, entomology, agricultural geology, and meteorology, unquestionably the average of our wheat, corn, and cotton crops would soon be doubled. The most important point is to learn what food, and what quantity per acre, will yield the largest annual profit. In addition to this, it is desirable to know what sources of supply of the raw material for making crops, so far as it is lacking in the soil, can be most economically resorted to by the farmer.

His sources of supply are numerous; among others, the subsoil and the atmosphere may be named as always available on the poorest lands. It is very rare, if ever, that a soil is so sterile that when three inches deep it cannot be made six; and if six inches deep, it may not be made twelve. If the reader will reflect on the facts of the case for a moment, he will be satisfied that the same resources in the earth and atmosphere, in rains, dews, solar light, and heat, which produce a little mould on the surface, extract a little lime, potash, magnesia, and soluble flint from the subsoil, may reasonably be expected to yield something more of all these elements of fertility, if they are skillfully husbanded from year to year. But, if these elements are all sold and sent off the farm; or if wasted thereon, no matter how, an increase of productiveness is impossible, unless guano or manure from abroad is bought for home consumption. Vegetable mould can only be increased by growing plants; and even then, different plants form mould, when they decay, of very unequal value in its adaptation to the peculiar wants of crops. As the science of feeding plants rests on precisely the same principles as that of feeding animals, and as plants alone have the power to subsist on disorganized minerals, such as air, water, sand, and lime, it is all important to grow such fertilizing and renovating vegetables as will best furnish nutriment to the plants to be cultivated for market. Thus, one thousand pounds of broomsedge, rotting on an acre, will yield mould far inferior to that of a like weight of pea-vines. In some respects, the sedge will have the advantage. It will supply more soluble silica than an equal weight of the stems, leaves, roots, and seeds of the pea plant, but much less of sulphur, phosphorus, and organized azote or nitrogen. Theoretically, the slow rotting of broomsedge, followed by the more rapid decay of pea-haulm, will prepare a soil for wheat or corn, better than to have it entirely free from either sedge or pea-vine mould. Different forest leaves furnish mould as unlike in value as that formed from rotting cabbages and decaying pine wood. But if a ton of cabbages or clover will form a mass of rich mould, it will require something better than very poor land to grow either clover or cabbage. They are both rich in sulphur, phosphorus, and nitrogen, elements that do not abound in sterile soils.

It is difficult to see how one can fairly begin to comprehend the natural capabilities of American soils, before he is familiar with the science of meteorology and the philosophy of manures. An acre of land lying in the latitude of Washington and St. Louis has the capacity to produce nearly double the food for man or beast that an equal area in the centre of Great Britain possesses; assuming the chemical composition and physical character of the soils to be alike in both countries; the fall of rain alike, and the only difference being in the length of seasons and a higher mean temperature and more sunshine in America than in England. There are few, if any, plants which equal our maize or Indian corn, in yielding a large quantity of bread on a small surface. In England, it is impracticable to grow one good crop of this cereal in a year. In the District of Columbia, on choice land, nearly, if not quite, two crops can be made in a season. Suppose the object was to produce milk (an exceedingly valuable article of food), not only can we grow twice as much corn for soiling cows on an acre, under American sunshine, as can be raised in Great Britain, but after frost sets in and before it is time to plant corn in the spring, a crop of winter wheat, rye, or barley can be two-thirds grown in Virginia, and harvested in Georgia, Alabama, Mississippi, Louisiana, Florida, and Texas. An acre of land in central Georgia will both feed and clothe two persons as well, and more economically, than the same area of soil of equal fertility will feed and clothe one person in the State of Maine. In the latter, only one crop can be made in a year; in the former, *three* can be grown, and two of them will contain an extraordinary weight of organized matter.

It must be remembered that the same high degree of solar light and heat which greatly favors the rapid as well as the prolonged growth of vegetation, promotes also in an equal degree the consumption of mould, and the exhaustion of the soil, if its crops are all removed, or if its tillage be unwisely directed. On comparing the fall of rain in Georgia with that of New York, the writer finds that as much water often falls, in twenty minutes, in the Southern as in forty minutes in the Northern States. Some thirteen inches of water fell in the month of July, 1849, in the city of Augusta, Georgia. The mechanical washing of cultivated fields at the South is an evil of no inconsiderable magnitude. To remedy this, good planters resort to horizontal ditching around hills, or on their slopes, so as to convey by a gentle inclination the surface water off, without cutting deep gulleys in the earth. Many of these conduits are constructed with commendable skill and scientific engineering, guided by a spirit or water level. The object sought is not to have the ditch so level with the horizon as to fill in a heavy rain and permit the water to break over its bank on the lower side; nor with such an inclination from the upper to the lower part of the side hill as to create a *washing* current in the ditch itself. It is also indispensable that these ditches be not too far apart. Too much care can hardly be taken of the soil to prevent its injury in any way. It is hard to persuade men that the intrinsic value of arable land is wholly independent of its market price—that to damage a soil which costs three dollars per acre is as injurious to society as it would be if it cost thirty dollars per acre.

The common interest which all have in the enduring fruitfulness of the earth has received very little attention in this country. Nothing is more certain than the fact that a district or State which exports largely the things which nature demands to form breadstuffs and provisions, must sooner or later export also some of its consumers of bread and meat. For the ten years preceding 1846, Ireland exported more bushels of grain than all the United States.*

* See McCulloch's Commercial Dictionary, and the official returns of this country in a table in this Report.

Although much of the grain sent from Ireland was oats, all farmers know that this is quite an exhausting crop. Nor did the people of that ill-fated island restore to their potatoe fields all the atoms removed in crops. Hence the plant failed to a signal degree; famine ensued, hundreds of thousands perished, and still more fled to England, Scotland, and America. Probably no State in the Union has done so much in the way of exporting its fertilizing atoms to other States and foreign nations, and wasting them at home, as Virginia. Next to New York, she has the largest number employed in agriculture. The practical result of this policy has been that she has lost more farm laborers, more citizens and more capital removed with these emigrating citizens, than any other State in the Union. This must always be the case the world over, except where the overflow of great rivers, or other means, serves to renovate the soil, exhausted by excessive cropping, or bad husbandry. The fact should be universally understood that a State can feed and clothe a population ten times larger at home than it can abroad. This result occurs from the circumstance that the peculiar atoms, indispensable to form food and clothing, exist in the soil only to a very limited extent. If this were not the case, England would not send hundreds and thousands of ships to distant islands and coasts to gather the dung of sea-birds solely to increase her annual crops. If no fertilizers were wasted in England, this expense need not be incurred.* Belgium sustains a population of three hundred and thirty-six to the square mile. With a population equally dense, Virginia would contain twenty-two million seventy-five thousand two hundred souls. Belgium, by the attention paid to saving manures, and with a climate inferior to that of the "Old Dominion," is able to export no inconsiderable quantity of beef, mutton, pork, butter, cheese, and some grain. It has nearly three million four hundred and twenty-two thousand five hundred and seventy-four hectares of land.† Of this, one million seven hundred and seventeen thousand three hundred and fifty-four are arable, and six hundred and forty-nine thousand nine hundred and fifty-two are in wood and forests. Prairies and meadows cover an area of four hundred and thirty-nine thousand five hundred and ninety-four hectares. Waste lands in uncultivated tracts four hundred and twenty-eight thousand two hundred and ninety-one. In his "Agricultural Survey of Flanders," Mr. Ratcliff says that the dairy-men keep their cow stables the year round as near as may be at the temperature of the month of May. Cattle (neat) are fatted and sold when two years old. The average number so disposed of, every year for fourteen years, was eight hundred and ninety-eight thousand and seventy-six. The soil in Flanders is naturally poor, and the maxim is, "Without stall-fed cattle no manure,

* For all practical purposes, fertilizing atoms are eternal; and so far as they are needed to form the products of rural industry, they should be retained in the service of man a thousand years. The whole system of crops forming manure, and manure forming crops, implies that there should be no waste of the least abundant elements of cultivated plants. An atom of potash, which aids in organizing the elements of water and carbon into starch in a kernel of corn in 1850, may perform a similar function every summer for the next one hundred years, if it be carefully preserved when it escapes from the body of the animal that eats the corn. In all its mutations of position and chemical combination, it can never be aught besides an *atom of potash.* Being so indestructible and valuable, why annually throw away potash enough to form a thousand million bushels of corn in the United States? What becomes of that contained in all the food consumed by twenty-two million people in this country? This is but *one item* of our loss of this and many other fertilizers.

† A *hectare* is a little less than two and a half acres (2.47).

and without manure no crops." To say nothing of the keep of dairy-cows, working oxen, horses, sheep, and swine, the people themselves equal one to every arable acre in the kingdom. Speaking of the "agricultural produce and practice" of Belgium, Mr. McCulloch remarks: "Corn (wheat), flax, hemp, and *timber* constitute the most important materials of the agricultural wealth of Belgium. The soil *artificially* enriched, produces commonly *more than double the quantity of corn required for the consumption of its inhabitants*, which is computed at six millions of hectolitres (each two and three-quarter bushels) per annum." This gives an aggregate of sixteen million five hundred thousand bushels of wheat. The six hundred and forty-nine thousand nine hundred and fifty-two hectares (over one million five hundred thousand acres) in woods and cultivated forests, yield a large profit in timber. The fact is the more worthy of note because of all the extravagant abuses of the bounties of Providence in this country, a reckless waste of timber is the least excusable. Timber is about as necessary as bread; and it requires a vastly longer time to grow a good oak than it does to fell one or grow a crop of corn. There are small forests of black locusts in this country which yield from twenty-five to fifty dollars worth of railroad ties per acre a year, with no very expensive culture. The grand secret of Belgian farming lies in their producing, keeping from loss, and good sense in applying manures. Of all civilized nations, we pay least attention to this part of good husbandry. Not one farmer or planter in a thousand appreciates the fact that the more fat cattle, fat hogs, or sheep he keeps, the more grain, tobacco, or cotton he can make on his farm. It is stated, on the above reliable authority, that the average for fourteen years of fat cattle sold in Belgium, was eight hundred and ninety-eight thousand and seventy-six head a year. The essential object in making so much beef (not a little of which is consumed in London), was the production of manure. The liquid excretions of a single cow sell at two pounds (ten dollars) a year.

Virginia sends to Massachusetts about a million bushels of corn per annum. If, in place of exporting this grain, it was fed to hogs and neat cattle and their meat exported, the manure derived from the grain consumed would give to the corn-growers of that State five hundred thousand bushels more corn in 1850 than they will now harvest. By pursuing the Belgian system a few years, the fertility of Virginia soils would be threefold greater than it now is. The State could then spare more breadstuffs and tobacco than it now does without injury to the land. A rich man can spend more money from his large income than a poor man can spend from a small one, and not become bankrupt.*

* How to extract generous crops of grain, tobacco, and corn from a soil, with the least injury and the greatest economy, is a study which investigates the following among other questions of fact:—

When ten bushels of corn are consumed by fattening hogs, cattle, or sheep, and all the solid and liquid manure formed by the grain is saved, how much additional corn with the aid of the stalks and cobs well rotted that grow with the ten bushels of corn, will these fertilizers produce? I have said in the text that a gain of five bushels may be realized, but under the most favorable circumstances a gain of *twenty* is attainable. Manure enables plants to draw more aliment from the atmosphere and the earth, than they could command without such aid. It is precisely this function in what are called renovating crops, such as clover and grass at the North, peas, grass, rye, and barley at the South, that increases the natural productiveness of land. Clover and peas never create a particle of new matter. They consume sun-light and heat, water, atmospheric gases and minerals in the surface and subsoil, to organize their roots, stems, leaves, and

All business men occasionally take an account of stock; all manufacturers estimate the value of the raw material consumed in the course of a year's operations but the manufacturers of agricultural staples. The latter seem to think that nature forms sixty bushels of corn or thirty of wheat from *nothing*. If this were so, then all soils should be alike productive and manure of no value. This is not the fact; and the production of good manure is an indispensable part of good husbandry. Hence the keeping of domestic animals can never be dispensed with to advantage, till the human family reach a density of population of about one person to a half acre. After that, an animal belonging to the *genus homo* (man) will furnish all needful fertilizers. With all our pride, we should remember that we are but "dust."

To show the capacity of arable land to produce breadstuffs, and not attempt to reach the extreme limit which is unknown, it is enough to say that our climate is equal to the yield of thirty bushels of wheat and eighty of corn per acre, provided the plants are properly fed. How should a farmer feed corn plants on his soil which is equal to the production of fifteen bushels per acre, so that the same will, in the course of a few years, grow crops five times larger?

To do this without going off the field for fertilizers is the end to be attained. Without now going into the details of corn culture, which will be discussed under its appropriate head, it may be stated that, if all the stalks, blades, cobs, and corn in the shape of manure, or the stalks and cobs rotted without being consumed and the corn eaten to furnish manure, be annually restored to the land, it will increase rapidly in productiveness. Allowing one bushel to plant five acres, the one-fifth of a bushel of seed placed in the soil will receive the fertilizers derived from fifteen bushels of corn in the previous crop. At this rate, it is plain that the vital germ in each seed will have the benefit not only of all the nutritive matter stored up in that particular seed, but what is contained in seventy-five other seeds that formed the manure. Nothing is more obvious than the fact that the aliment in a seed, whether of cotton, wheat, or corn, nourishes the germ of the growing plant. Hence the fertilizing atoms derived from seventy-five other seeds, whether these atoms have passed through the system of any animal or not, will naturally develop more, longer, and larger roots in the plant, than it would without such aid.

These more numerous and more extended radicles enable the plant to imbibe food from a greater depth and from a wider and broader surface than it could otherwise command. Now, if we assume that the stalks, cobs, and corn of the previous crop of fifteen bushels are able to produce as much matter a second time, it will be seen that the second crop has a double advantage over the first. Whatever may be the positive gain, the farmer has only to repeat the operation, as is done in Flanders, to bring up his soil to the production of very large crops of corn. It is true that one hundred pounds of food of any kind eaten by an animal yield generally only about forty pounds of dry excretions; nearly sixty per cent. being discharged from the system through the lungs by constant respiration, and a little by sensible or insensible perspiration. But so much as goes into the atmosphere in this way, rains and dews bring to the earth again; and plants seldom lack

seeds. These rotting will feed cotton, wheat, corn, or potatoe plants in a direct and economical way. Deep and thorough tillage promotes the luxuriant growth of vegetation and the enriching of the soil, if its products be wisely husbanded.

carbonic acid, beyond what good stable manure will supply. The atoms discharged from the system through the kidneys cannot be dispensed with, no matter what animal eats the products of the soil.

Viewed as a philosophical question, the well-established fact that one hundred pounds of the dung of birds often produce three hundred pounds of wheat and five hundred of corn, is one of the most interesting in nature. Place man and his most urgent wants out of view, and why should one hundred pounds of gypsum ever augment a crop of clover one thousand or two thousand pounds? This salt of lime contains but eighteen and a half pounds of pure *sulphur*, yet it enables clover plants to extract twice that amount of this mineral from the earth, under favorable circumstances, by extending their roots deep into the sub-soil. How plants grow, and the art of feeding them as well as animals, are questions full of interest as matters of scientific research, irrespective of any practical importance that attaches to agriculture.

All cultivated plants and all domestic animals, not less than the soil, are susceptible of indefinite and very valuable improvement. Every advance of this kind virtually increases the productive power of the earth and of manual labor. But the most important improvement of all is to improve the farmer himself, that he may be able to read and understand the immutable laws of nature and uniformly obey the same, as they exist in the mineral, vegetable and animal kingdoms. His profession is a most intellectual one, and there is no good reason why the cultivator of American soil should not be the most thoroughly educated business man in the world. Great improvements are attainable; and if Congress and State Legislatures will render a little assistance in the way of collecting, annually, reliable statistics, that we may go to the people with facts and figures the truth of which none can gainsay, one hundred per cent. can soon be added to the productive industry of five millions of farm laborers. There is an undeveloped power of production in American soil and muscle, and above all in American mind, which ought no longer to be neglected. Although the science of human progress is in its infancy, yet the little that has been achieved within the last thirty years, and mainly by the study of natural phenomena and the application of the knowledge so acquired to all the purposes of civilized life, promises a tenfold larger harvest when science shall direct the culture and economy of every farm in the Republic. Few are aware how much honest hard work is worse than thrown away by its unwise expenditure.

III.

AGRICULTURAL METEOROLOGY.

THERE are few sciences the study of which is more useful to the farmer than that of meteorology. A soil may contain all the atoms required to form a luxuriant crop, yet if the temperature of the ground, or of the air above it, be too low, vegetation makes no progress. Again, the earth and atmosphere may have a due degree of warmth and light, as well as abound in all the food of plants in an available form, except *water*, and the absence of this element will be fatal to the hopes of the husbandman.

Atmospheric air, light, heat, electricity, rain, dew, snow and frost, exert a controlling influence over the growth of all cultivated plants. A knowledge of the natural laws by which these, generally invisible and imponderable bodies, are governed, so far as researches have revealed them, is alike valuable and interesting. The atmosphere and the numerous phenomena of which it is the theatre should command more attention in this country than they hitherto have received, if we intend to keep pace with the progress of physical science in Europe. To encourage the study of meteorology in its application to agriculture, is the object of this paper.

THE ATMOSPHERE is mainly composed of two distinct gases, which are invisible but not imponderable bodies, and everywhere surround the planet like an ocean. It has a mean depth of some forty-five miles. The gases which form the air are called *nitrogen* and *oxygen*. According to the accurate analysis of dry, pure air, made by MM. Dumas and Boussingault, one hundred parts consist of 20.8 oxygen and 79.2 nitrogen. These chemists found from two to five parts of carbonic acid in ten thousand of atmospheric air. Dr. Fresenius has ascertained that the proportion of ammonia in the atmosphere is one part in two millions, varying to one in three millions. Undoubtedly, there are many other volatile and gaseous bodies in the atmosphere, but in a state so extremely diluted and diffused as to escape all chemical tests. Sir Robert Kane found that sulphuretted hydrogen will pass through a thin piece of India-rubber into the atmosphere, against a pressure equal to fifty times the weight of common air.

Gaseous compounds of phosphorus, chlorine, and sulphur, are constantly discharged from decaying animal and vegetable substances into the atmosphere.

It is one of the laws peculiar to all gases, that the presence of one in any given space does not in the least prevent several others from occupying the vacancies between atoms of gas that seem to repel each other with singular aversion. The facility with which the atmosphere takes up vapor, when water evaporates, is familiar to all. This capacity to hold immense quantities of water imbibed from the ocean, lakes, rivers, the foliage of trees, and moist earth, in a volatile condition, to be distributed over broad continents, is a wonderful provision of nature. But the filling of the air with water like a wet sponge is less remarkable than the contrivance for *squeezing the sponge*, so to speak, and causing the diffused moisture to fall in gentle rains, snows and dews. The drying of the atmosphere, after it is saturated with water, is a phenomenon, without which it would never rain; nor could there be any springs, rivers, land plants or animals on the globe. This precipitation of water is effected by a change of temperature; which change is the result of the revolution of the earth on its axis, and of solar heat. Day and night, spring, summer, autumn and winter, with their ever-varying temperature, varying winds and clouds, and constantly changing humidity, are all results of fixed laws, which invite the research of every reasoning mind.

SOLAR HEAT.—According to Professor Forbes, the rays of heat coming from the sun and passing through the atmosphere in the shortest line, at the latitude of Paris, lose twenty-five per cent. of their calorific power by the time they reach the earth. Rays that strike the atmosphere at an angle of only twenty-five degrees, part with half their intensity or heat by the time they touch the ground. The molecules of air absorb and radiate heat into space the same as other ponderable bodies. Hence, no matter how clear the atmosphere, neither the rising nor the setting sun imparts so much light or heat to those parts of the earth so affected as they receive when the sun is at the meridian.

The effect of solar rays on the earth is still farther diminished morning and evening by the fact that fewer fall on any given area, because they impinge upon the surface obliquely. One can look at the setting sun with impunity, not because it emits less heat or light at that time, but because the rays are mostly absorbed and radiated in passing through many miles of atmosphere, before they reach the eye of the observer.

The facility with which solar heat penetrates and warms the soil to the depth of six, twelve, eighteen and twenty-four inches, and the radiation of heat from the earth, the leaves of plants, and all other substances, deserve particular notice. A distinction must be made between the radiation of heat from the surface of any body, and the transmission of it through any substance, as iron, wood, water, mould or soil. All these hold different relations to this peculiar element. It is not intended to take more than a popular view of this subject. At the time of seeding in spring, a single day is sufficient to warm to the depth of four inches a mellow soil, recently ploughed. Two days of sun will warm the ground six inches; and six days twelve inches. The fall of warm rain on a well-drained, mellow soil, greatly hastens the heating of the earth. On the contrary, the fall of cold rain, or much cold water in the ground, greatly retards the rise of temperature in tilled land. Heat and water should be studied together, if one would obtain a clear idea of their joint influence on vegetation. When water evaporates, it expands to sixteen hundred and ninety-six times its former volume, and renders latent, or insensible, a considerable amount of active heat. Hence, a wet piece of ground, from the surface of which a good deal of water evaporates, is always cooled by the constant loss of sensible heat, which rises in vapor, and departs far into the atmosphere.

The warmer the atmosphere the greater its capacity to hold water in the condition of a diffused, invisible vapor. The lower strata of air are heated much more by caloric radiated from the earth than by the absorption of

heat in its passage from the sun to the planet. Air thus heated becomes expanded or rarified, and specifically lighter than the colder air above it. This causes the air within and near the tropics to rise high above the surface of the earth, and flow over both north and south, toward either pole; while colder and heavier air rushes in toward the equator to fill the empty space. These aerial currents are deflected in their courses by the diurnal revolution of the earth, and by mountain ranges whose summits are often covered with eternal snow; and they are still farther modified by the varying temperature of the ocean, and its peculiar streams.

Heat and water are the fruitful parents of winds and clouds. When aqueous vapor is precipitated in rain or snow, heat that was latent becomes again sensible, and by increasing the capacity of the air to hold water in the form of vapor, prevents a disastrous deluge of this abundant element in nature.

The laws which restrain the precipitation of water from clouds are no less curious than those which cause it to rain at all. The atmosphere must approach saturation before it can rain; and it usually happens that the quantities which will fall on a given area one hundred feet above the ground, and on the earth, are unequal. Large drops in falling through many feet of dry air become smaller by constant evaporation, and may be wholly dissipated before they reach the earth. On the other hand, quite small drops formed in cold regions high in the air constantly condense more vapor in falling through a saturated atmosphere, and will be many times larger when they reach the ground than at their starting point.

To illustrate the production of rain, let us suppose that a current of air at seventy degrees temperature, saturated with moisture, meets and mingles with another current, also saturated, but having a heat of fifty degrees. Now, if the atmosphere at the mean temperature of sixty degrees had a capacity to hold water as an invisible vapor, equal to the mean of seventy degrees and fifty degrees, it is obvious that no precipitation would take place. But such is not the fact. The quantity of water held in air, heated from sixty to seventy degrees, cannot be contained in that heated from fifty to sixty degrees. In other words, whatever cools air, saturated with moisture, causes a cloud, dew, mist or rain.

Early and late frosts are produced by the radiation of heat during clear nights, from the foliage of plants and other terrestrial bodies. If the temperature of the air is not very low at sundown, and it is humid, vegetation will so soon reach the *dew-point* that the latent heat evolved by the formation of much dew will prevent a frost. If the atmosphere is dry, clear and still, the dew-point is lower, and all the circumstances are favorable to freeze the little vapor condensed on such substances as radiate heat with the greatest facility. Anything which checks the radiation of heat, like a cloud, smoke, screen, or wind which agitates the atmosphere, serves to prevent frost.

Every farmer should have a thermometer and rain-guage, and know the degree of heat most favorable to all his crops. The due temperature and moisture of the soil are as much elements of production and profit as good manure and skillful tillage.

The writer has studied the growth of corn in different months, noting the changes from four o'clock A. M. to M.; from noon to eight P. M.; and from eight P. M. to four A. M. When the temperature is favorable, corn grows as much per hour in the night as in the daytime.

No agriculturist is so far advanced in the science of climatology as to

make all that can be made of the water, solar light and heat, which nature so bountifully supplies. There is no State in the Union where the mean temperature of summer is too low to ripen maize, or corn, as is the case in England, Scotland and Ireland. The cutting down of too much timber in some parts of the country has operated to change, in some degree, the climate, and render large districts more subject to alternate droughts and rainy seasons. In summer, when frequent and moderate rains are greatly needed, the air is too dry to yield much more than respectable dews, for many weeks in succession.

To learn the well-authenticated results of clearing forests, in drying up natural springs, and changing climates, regularity of rains, &c., the reader is referred to the writings of Humboldt, Kaemtz, Forbes, Boussingault, and other meteorologists. Humboldt remarks, "In felling trees which cover the crowns and slopes of mountains, men in all climates seem to be bringing on future generations two calamities at once—a want of fuel and a scarcity of water."*

The waste of valuable timber in the United States, to say nothing of firewood, will hardly begin to be appreciated until our population reaches fifty millions. Then the folly and short-sightedness of this age will meet with a degree of censure and reproach not pleasant to contemplate.

Different plants require unlike degrees of heat and light to bring them to maturity. The potato will produce an edible tuber at a mean temperature so low that neither its own seeds nor those of any cereal can be formed. Boussingault found them cultivated in South America, at an elevation having a mean heat as low as forty-nine degrees, requiring eleven months in which to grow, or three hundred and thirty-five days between the planting and digging. In many parts of this country, persons begin to dig potatoes in seventy days from the planting; and potatoes planted the first of May will be ripe by the first of August. In some of the Southern States they grow best in the winter season. Winter barley and rye will mature their seeds at a lower temperature than wheat. Humboldt found at Jakoustk, in high-central Asia, where the earth was constantly frozen at the depth of three feet below the surface, both rye and wheat yielding a return sometimes of fifteen to one of seed. At that place, the mercury is frozen two months in the year, the cold being over seventy-two degrees below freezing. Short as the summers are, they have a mean temperature of sixty-four degrees.

On the northern slope of Monte Rosa, in Switzerland, barley ceases to grow at an elevation of four thousand two hundred and sixty feet above the sea; on the southern side, it continues to be cultivated at the height of about six thousand five hundred and sixty feet. Boussingault says that the difference is ascribed to local causes.

In studying the mean temperature and annual fall of rain, including snow and dew, in the United States, and the distribution of both heat and water through the year, one can hardly escape the conviction that no other equal area on the globe has equal agricultural capabilities. Without including Delaware, there are within a fraction of six hundred million acres in the Southern States. On two-thirds of this vast surface, wheat is harvested early enough in May and June to permit a crop of corn to mature before autumn frosts. By drawing a line from the Atlantic due west to the Rio Grande, so as to have three hundred million acres south of it, on every arable acre two crops

* Humboldt, vol. v. p. 173.

of this most valuable of breadstuffs can be harvested in a year. Allowing one-third of this area for forests, the beds of rivers, and irreclaimable surface, and there is left two hundred million acres for cultivation. On the supposition that the south had a population adequate to demand such crops, one hundred million acres might be drilled with seed wheat in November, after corn harvest, putting half the needful fertilizers in with the seed, and sowing the balance broadcast in February or March, after the English and Belgian practice. With skillful culture and feeding, an average return of twenty bushels might reasonably be expected, producing an aggregate crop of two thousand millions of bushels. This crop would be harvested between the 10th of May and 15th of June, after which a crop of corn may be grown. With a dense population, as in Belgium, France, and many parts of China, there can never be a real lack of fertilizers; so that sixty bushels of corn can be produced on every acre of arable surface in our thirty States. By this estimate, it is seen that the same land which had produced two thousand million bushels of wheat might, so far as the *climate* is concerned, easily yield six thousand million bushels of corn, in season to seed with wheat again in autumn. Of the other one hundred million acres of arable soil, one-half may be planted in cotton and enriched no more than to give an average of a bale of four hundred pounds to the acre. This will secure an annual crop twenty times larger than is now grown in the United States, and fifteen times larger than the consumption of the whole human family. There will still remain fifty million acres adapted to the culture of sugar-cane, rice, tobacco, and other important staples.

The United States possess a territory embracing over two thousand millions of acres, more than a moiety of which is arable land, and a climate whose mean temperature and fall of rain greatly favor the production of human food and clothing.

As we are now engaged in laying the foundation of an empire such as the world has never seen, nor scarcely conceived possible, every advantage of soil, climate, natural products, and such valuable trees for timber, fruit and fuel, as may be profitably cultivated, should command universal care and attention.

The following meteorological tables and statistics are compiled from the accounts received at this office, and contain valuable information as to the temperature, fall of rain, &c., in various parts of the United States.

Mean annual depth of Rain for four years.

(From records of the Smithsonian Institution.)

	Inches.
Fort Constitution, N. H.	28.85
Watertown Arsenal, Mass.	39.60
Fort Hamilton, N. Y.	45.71
Hancock Barracks, N. Y.	36.92
Watervleit Arsenal, N. Y.	34.[illegible]
West Point, N. Y.	48.70
Alleghany Arsenal, Penna.	28.14
Dearborn Arsenal, Mich.	31.30
Fort Brady,	31.[illegible]
" Howard,	38.[illegible]
" Winnebago,	31.88
" Snelling, Iowa.	30.32
" Crawford, Wis.	29.54

	Inches.
Fort Leavenworth, Mo.	32.68
St. Louis Arsenal, Mo.	24.12
Fort Smith, Ark.	35.64
" Gibson, "	30.64
" Towson, "	46.73
New Orleans Barracks, La.	51.85
Fort Wood, La.	47.90
Key West, Florida,	31.39
Charleston, S. C.	33.89
Fort Monroe, Va.	52.53
" McHenry, Md.	40.80
Washington City, D. C.	34.62
Baltimore (8 years),	39.90
Boston (22 years),	39.23
Hanover, N. H.	38.00
State of New York,	36.09
State of Ohio,	36.00

HARVARD OBSERVATORY, CAMBRIDGE, MASS., *Jan. 18th*, 1850.

DEAR SIR—Yours of the 15th instant I received yesterday. In answer to your inquiries, I enclose the mean temperature of the external air at this place, for each month from 1842 to 1849 inclusive.

	1842	1843	1844	1845	1846	1847	1848	1849
	Fahr.							
January,	27°.1	29°.6	15°.3	27°.2	27°.4	26°.4	29°.1	24°.6
February,	31.6	16.5	24.6	27.6	21.3	25.9	24.7	18.2
March,	37.4	25.7	33.8	36.2	38.2	30.8	32.2	35.8
April,	44.4	43.5	48.4	46.3	49.5	42.0	45.5	45.3
May,	61.7	64.5	57.3	56.6	55.8	53.3	57.8	52.6
June,	62.6	64.2	65.1	68.1	65.0	64.7	64.8	67.7
July,	72.7	69.2	68.2	72.1	71.6	73.0	70.2	71.6
August,	67.5	69.9	67.7	71.3	70.2	68.1	69.5	70.9
September,	58.2	60.6	64.0	60.2	67.7	60.9	58.6	60.0
October,	48.1	47.3	45.5	51.8	51.2	47.7	49.8	49.2
November,	34.8	34.3	34.3	44.3	43.2	44.1	36.2	45.0
December,	23.8	26.9	26.6	25.6	27.4	34.8	35.2	28.9

Respectfully and sincerely yours,
WM. CRANCH BOND.

DANIEL LEE, M. D.,
Patent Office, Washington.

YALE COLLEGE LIBRARY, NEW HAVEN, CONN., *Jan. 24th*, 1850.

SIR—Your letter of the 15th inst. with inquiries respecting the mean temperature of New Haven, was duly received, but as a reply to the second query could not be given without some reduction of the original calculations (which were made for the Connecticut Academy of Arts and Sciences, at New Haven), I have been obliged on account of pressing engagements to delay a few days.

The mean temperature of the year at this place is 49° Fahr. very nearly. Taking four years at random, I find the mean temperature for the six months from April to Sept., each inclusive, to be,

at sunrise, 55°.74 Fahr.;
1 and 2 P.M., 71°.44;
10 P.M., 60°.91.

A larger range of years would probably make a little change in the figures; but these results are perhaps exact enough for your purpose.

Respectfully your obedient servant,
EDWARD C. HERRICK.

DR. D. LEE,
Agricultural Rooms, Washington.

COLLEGIATE INSTITUTE, ROCHESTER, N. Y., *Jan.* 19*th*, 1850.

The annual mean temperature of the year 1849 at Rochester is 46°.48 Fahr.

The mean for the six months from April to Sept. inclusive, is 60°.14. The total fall of rain and melted snow for the year, as above, 32$\frac{87}{100}$ inches. For the six months, as above, 18$\frac{5}{10}$ inches—distributed as follows: April 1.44; May 3.81; June 4.33; July 0.94; August 3.62; September 3.91.

Total number of fair days during the year, one hundred and sixty-two.

Number of cloudy days during the year	203
" " fair days during the six months as above . .	110½
" " cloudy " " " . .	72½
Highest range of the mercury, 95° . .	July 10th.
Lowest " " " 9° below zero, . .	Jan. 12th.

Respectfully yours,
L. WETHERELL.

Abstract of a Meteorological Journal for 1849. At Penn Yan, Yates Co., N. Y. North Lat. 42°42′. Lon. west from Washington, 0°51′. By H. P. Sartwell, M. D.

Warmest day in the year	July 12th, 90°
Coldest " "	Feb. 15th, 15°
First autumnal frost	Oct. 2d.
First fall of snow	Nov. 22d.

	Mean temperature.	Maximum.	Minimum.	Monthly range.	Warmest day.	Coldest day.	Prevailing winds.	Rain and melted snow.	General character of the month.
								Inches.	
January,	22°.12	52°	– 4°	56°	25th	10th	W. S & NE	.57	Pleasant for winter.
February,	21.18	50	–13	63	28th	15th	W. SW & S	.54	Windy, unpleasant.
March,	38.64	62	6	56	21st	4th	N. S. W	.85	Cloudy, disagreeable.
April,	40.96	70	17	53	7th	15th	W & S	.48	Dry and raw.
May,	52.22	86	27	59	22d	2d	S & W	3.12	Wet, unpleasant.
June,	64.83	88	40	48	21st	9th	S. SW & W	2.90	Pleasant.
July,	66.77	90	39	51	12th	2d	S & W	1.60	Hot and dry.
August,	67.22	86	50	36	5th	1st	S. SW & W	1.69	Hot and dry.
September,	58.60	82	39	43	14th	9th	W & SW	1.37	Warm and pleasant.
October,	46.66	67	21	46	16th	31st	W. SW & S	6.29	Wet and chilly.
November,	44.66	66	26	40	5th	29th	S. SW & W.	2.88	Raw, disagreeable.
December,	27.25	42	– 2	44	20th	25th	W. NW & N	1.38	Cloudy, unpleasant.

Total fall of rain 22.97 inches.
Annual mean temperature 45°.46.

Meteorological Observations made at the New York Hospital for the year 1849. *By John Darcey.*

1849	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Barometer.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	
Maximum	29.65	30.57	30.40	30.27	30.44	30.28	30.22	30.15	30.36	30.25	30.24	30.44	
Minimum	29.51	29.65	29.43	29.16	29.53	[illegible]	29.72	29.73	29.57	[illegible]	29.53	29.00	
Mean	30.28	30.04	29.97	29.84	29.97	[illegible]	30.04	29.99	30.00	29.88	29.93	29.97	
Thermometer.													
Monthly mean	28°	27°	40°	46°	55°	70°	70°	72°	64°	53°	49°	33°	
Highest	52	47	68	66	78	91	94	82	79	67	67	50	
Lowest	4	7	27	26	40	55	55	60	51	[illegible]	32	9	
Range	48	40	41	40	38	36	39	22	28	28	34	41	
Warmest day	26	24	31	4	4	22	18	7	17	17	4	1	Total.
Coldest day	11	19	4	15	6	12	31	1	9	31	2	26	
Fair days	10	6	9	11	6	13	11	9	15	6	7	7	109
Cloudy days	3	6	2	3	7	4	8	9	7	8	9	6	72
Rain fell	8	1	10	6	16	8	8	11	7	14	9	7	103
Inches of rain and melted snow	.56	1.99	5.55	1.00	3.77	.79	3.08	5.58	.73	6.56	2.02	4.39	36.01

Meteorological Observations at Newark, N. J., 1849. *By W. A. Whitehead.*

	THERMOMETER.			WEATHER.				
	Highest daily mean.	Lowest daily mean.	Monthly mean.	Fair days.	Rainy days.	Snow.	Rain and melted snow.	Prevailing winds.
January	47°.50	6°.00	26°.33	18	6	2	.64	N.W.
February	37.12	11.88	24.62	15	5	9	2.69	S.W. and N.W.
March	59.25	28.00	40.17	16	12	3	4.85	N.W. and N.
April	57.00	30.50	47.20	19	5	—	.91	N.W. and W.
May	70.13	39.62	55.52	15	11	—	4.23	N.E. and S.E.
June	83.12	50.75	70.15	21	6	—	1.09	E. and W.
July	89.00	63.13	73.84	21	6	—	2.36	N.E. and S.E.
August	76.00	67.12	72.12	21	11	—	8.08	E. and S.E.
September	75.50	57.00	64.38	23	7	—	1.60	N.W., N., N.E.
October	60.38	41.50	53.12	14	10	—	6.93	N.W. and N.E.
November	61.62	33.50	49.65	16	8	—	2.18	N.W. and S.W.
December	44.38	12.50	33.25	18	8	8	4.47	N.W. and W.
Results.								
1849	63°.42	36°.71	50°.89	214	95	22	40.05	
1848	64.37	36.71	51.24	233	91	23	36.90	
1847	65.30	36.62	50.66	219	91	31	54.83	
1846	65.43	36.30	51.66	209	98	23	51.57	
1845	64.28	37.65	51.37	238	88	24	36.47	

The observations upon which the yearly results in the above table are based, extending over five consecutive years, afford reliable data for some general deductions respecting the climate at this place.

The highest stage of the mercury in the course of five years was 99½°. The lowest was 2½°—making the range 102½°.

Abstract of Meteorological Register, kept for the Delaware County (Pa.) Institute of Science.

North Latitude 39° 55′ 18″. Longitude 1° 36′ 10″ east from Washington. Altitude above tide water 175 feet.

Months.	THERMOMETER. Highest.	Lowest.	Mean.	BAROMETER. Highest.	Lowest.	Mean.	WEATHER. Cloudy.	Fair.	Rain fell.	Snow fell.	RAIN GUAGE. Inches.
December, 1848	65°.50	24°	42°.98	30.58	29.68	30.03	19	12	13	4	5.08
January, 1849	52.66	1.50	28.63	30.76	29.67	30.12	18	13	6		.81
February	46	-1.50	27.03	30.60	29.66	30.11	16	12	4	6	2.65
March	66	16	41.58	30.45	29.52	30.03	17	14	14		4.54
April	72	24	49.48	30.32	29.27	29.99	19	11	9	2	1.47
May	83.50	41	57.22	30.48	29.56	30.01	17	14	15		4.48
June	98	45	71.71	30.35	29.70	30.27	12	18	8		2.86
July	95	52	72.85	30.30	29.75	30.09	16	15	10		2.31
August	89	53	71.95	30.20	29.78	30.02	14	17	8		6.02
September	88	43	62.29	30.43	29.66	30.10	10	20	8		.48
October	73	33	53.11	30.30	29.42	30.00	19	12	12		8.65
November	68	29	49.72	30.31	29.52	29.99	15	15	7		2.50
Result			52.37			30.06	192	173	114	12	41.85

Annual Report of Temperature and Rain at Springdale, near Louisville, Ky.

	1848 October.	November.	December.	1849 January.	February.	March.	April.	May.	June.	July.	August.	September.	Annual mean.
Mean temperature	Fahr. 53°	38°	43°	33°	33°	49°	53°	63°	72°	72°	71°	65°	53°.8
Rain	Inches. 2.46	4.75	10.90	5.53	3.06	4.08	2.23	4.29	4.65	4.07	2.78	1.01	49.81

Highest range of thermometer, June 27, 90°.
Lowest range of thermometer, February 19, 7° below zero.

Meteorological Table of Monthly Means, kept at Nightingale Hall, on Pedee River, S. C. By James Kelly.

Months.	THERMOMETER. Sunrise.	2 P. M.	Sunset.	WEATHER. Rainy days.	Clear.	Overcast.	Variable.	DIRECTION OF WIND. NO. OF DAYS. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	41°	44°	45°	3	2	—	—	9	8	8	1	1	4	2	3
February	45½	49½	46	2	5	8	18	6	—	4	2	—	1	—	3
March	57½	62	61	5	3	8	15	2	2	2	7	4	6	2	5
April	67	72	69	2	2	5	21	2	2	7	5	1	—	5	6
May	71	79	74½	7	6	2	16	—	—	1	11	1	2	3	11
June	77½	83	78	6	1	2	21	—	—	—	8	—	6	4	16
July	77	79	78	19	—	—	—	—	—	3	2	1	4	10	4
August	78½	82	80	11	1	1	18	1	—	3	4	3	4	2	3
September	77½	77	75	10	1	—	—	4	—	9	7	1	—	1	—

Abstract of Meteorological Observations, for 1849, at Columbia, S. C., Latitude 34°. By A. Fitch.

Months.	THERMOMETER. MEAN TEMPERATURE. 7 A. M.	2 P. M.	9 P. M.	Hottest day.	Coldest day.	WEATHER. Fair.	Cloudy.	Rain.	Hazy.	Quantity of rain.	Prevailing weather.
January	Fahr. 37°.08	51°	42°.16	15°	12°	17	10	4	0	Inches. 1.	Fair
February	35.21	42.13	42.08	5	19	18	7	1	2	1.12	"
March	50.09	65.04	55.	21	4	20	6	5	0	3.87	"
April	52.04	72.10	59.21	25	16	23	1	4	2	1.50	"
May	66.27	78.28	71.16	9	12	20	2	9	0	7.62	"
June	75.17	80.23	79.05	24	12	17	7	6	0	3.12	"
July	78.09	80.13	76.17	1	5	11	7	13	0	7.50	Rain
August	74.04	84.30	78.25	18	11	24	1	6	0	4.37	Fair
September	67.22	80.18	73.04	30	25	22	4	4	0	2.37	"
October	53.20	69.16	59.20	1	31	18	3	9	1	5.75	"
November	44.29	69.17	49.23	7	21	22	7	1	0	0.62	"
December	42.01	53.15	46.16	10	12	14	10	6	1	5.50	"
Total						226	65	68	6	44.34	

Extract from the Meteorological Journal, kept by the Young Ladies of the Oakland Institute, at Jackson, Miss. For the year ending November 30, 1849.

Months.	THERMOMETER. Least height.	Greatest height.	Mean for the month.	RAIN. No. days.	Depth in inches.	WEATHER. Clear and pleasant days.	Damp and unpleasant days.
December, 1848	27°	79°	55°.02	11	8.11	14	17
January, 1849	26	78	51.09	6	2.74	13	18
February	14	78	46.50	4	.69	22	6
March	33	84	65.53	4	3.55	23	8
April	30	86	64.40	6	2.89	22	8
May	56	87	72.80	13	6.89	21	10
June	66	90	77.29	14	4.57	17	13
July	68	90	77.88	21	12.26	5	26
August	71	91	80.58	12	3.38	13	18
September	52	91	74.82	2	.32	27	3
October	34	86	63.64	4	6.25	24	7
November	33	79	58.17	6	9.54	23	7
Total				103	60.83	241	141

Mean height of thermometer, for the year, 65°.64.

Note.—The mean height of the thermometer is the mean of four observations daily. The "No. days' rain" includes every day on which rain fell, without regard to quantity. The "damp and unpleasant days" include many days that were only partially so.

Abstract of Meteorological Observations, near Washington, Arkansas. By N. D. Smith.

Months.	THERMOMETER. Highest.	Lowest.	RAIN. 1849	1848	1847	1846	1845	1844	1843	1842	1841
			In.	In.	In.	In.	In.	In.	In.	In.	In.
January	72°	18°	6.62	2.	2.62	2.5	7.25	2.5	2.75	3.25	5.
February	78	6	5.62	2.5	6.75	4.	2.	2.87	1.5	3.62	.12
March	80	34	5.25	4.25	9.5	3.5	7.37	6.87	[illegible]	4.37	[illegible]
April	86	32	2.37	5.5	5.87	6.62	5.37	7.5	9.12	4.	5.
May	85	54	[illegible]	5.25	3.75	2.37	4.87	[illegible]	[illegible]	1.87	7.
June	90	60	2.62	8.62	3.87	4.12	6.75	4.75	[illegible]	5.5	[illegible]
July	91	70	18.5	6.5	5.29	3.25	2.5	1.12	[illegible]	1.62	[illegible]
August	94	68	3.87	2.87	7.25	1.	.25	1.12	3.	4.	[illegible]
September	90	56	1.37	1.	1.5	1.75	2.	4.5	6.87	1.5	[illegible]
October	84	38	3.	2.75	1.	[illegible]	[illegible]	4.12	6.75	2.62	8.5
November	80	34	4.62	6.75	5.25	2.25	1.	2.5	10.	[illegible]	2.87
December				9.5	4.12	3.75	4.12	1.5	3.37	5.12	[illegible]
Total				58.5	56.75	37.87	50.75	43.95	[illegible]	40.12	[illegible]

Meteorological Observations at Fort Madison, Iowa. By D. McCready.

1849	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly mean.
Mean temperature	16°.56	21°.31	40°.36	49°.79	59°.37	74°.26	73°.56	71°.59	66°.94	52°.28	47°.54	21°.94	49°.62
Fall of water		1.50	11.05	5.47	2.90	3.33	.70	10.91	7.80	3.30	8.15	.10	Total. 55.29
Fall of snow	12.	2.50										6.	20.50

The coldest day during the year was the 18th of February; the lowest range of the thermometer on that day being 18° below zero—the daily mean 6°.38 below zero.

The warmest day was the 9th of July—at 2 o'clock, 100° in the shade.

IV.

SECOND REPORT ON THE BREADSTUFFS OF THE UNITED STATES, MADE TO THE COMMISSIONER OF PATENTS, BY LEWIS C. BECK, M.D.

RUTGERS COLLEGE, NEW BRUNSWICK, N. J., *January 1st*, 1850.

SIR:—I beg leave to lay before you the results of my researches in regard to the breadstuffs of the United States, since the date of my former report made to the Hon. Edmund Burke, on the 15th of December, 1848. In that report I have given a full account of the objects of the investigation, and the modes adopted in its prosecution. There is little difference of opinion concerning the importance of our breadstuffs; but there is still, it seems, a want of general information as to the causes which have an influence upon their value. Among these the most important undoubtedly is carelessness in the shipment from the interior to our commercial depots, and from thence to foreign ports. It is to this point that my attention has been particularly directed, as one of great utility; and the large number of samples of American wheat and wheat flour which have been received from England, have enabled me to arrive at some general conclusions upon the subject. The analyses of several samples, the growth of various foreign countries, have also afforded me an opportunity of comparing the American and foreign wheats and flours. With a few exceptions of peculiar varieties, it will be seen from the results that with ordinary care the wheat of this country will compare advantageously with that of any other. Indeed, on reviewing my analyses, I question whether there is any part of the world where this grain is generally of a finer quality than it is in the United States. But all the advantages which we possess in this respect will be of little avail so long as inferior and damaged breadstuffs are shipped from our ports.

In addition to the analyses which I have executed of the various samples of wheat and wheat flour according to the mode heretofore pursued, I have performed a series of experiments for the purpose of settling the important question in regard to the relative value of the fine flour of wheat, and the "whole meal." I have also consulted every work within my reach which could throw any light upon the different points that have presented themselves during the progress of the investigation.

The large number of samples of wheat and wheat flour which have been placed in my hands for examination, have left me no time for the analysis of our other breadstuffs. I trust you will excuse me for saying that I have at least not been wanting in industry. Notwithstanding the depressing influences which during the past season were so general, I have prosecuted my researches with little interruption. Whether these researches shall be continued, and whether they shall be continued under my direction, are

questions, the decision of which must be left to your appreciation of their importance and of the manner in which they have thus far been conducted.

I have the honor to be
Your obedient servant,
LEWIS C. BECK.

Hon. THOMAS EWBANK,
Commissioner of Patents, Washington City.

REPORT.

General Remarks upon the value of our Breadstuffs.

The experience of the past year may perhaps have led many persons to suppose that the statements which I have heretofore made concerning the importance of our breadstuffs, in a commercial point of view, were too highly colored. It cannot be denied that the amount shipped to foreign ports during that period is considerably less than for the two preceding years. In the mean time, however, a new and important market has been opened in our own territories on the Pacific. It may also be safely affirmed that the causes for foreign demand, and which must hereafter operate, still remain. These are, the cheapness of land in this country, and the peculiar adaptation of our soil and climate to the growth of the two important cereals, wheat and maize.

Another fact, it seems to me, is of sufficient interest in connection with this subject, to be here noticed. The failure of the potato crop in various parts of the world for several years past has engaged the attention of scientific and practical men. Unfortunately, the nature of the blight which has seized upon this tuber has eluded the most careful inquiries; but it has been shown by well-conducted analyses that potatoes at their late prices are the most expensive kind of farinaceous food. This will be evident from the following statement:—

"Potatoes contain from about seventy to seventy-nine per cent. of water, while the proportion in wheat flour is from twelve to fourteen per cent. And while the gluten and albumen in potatoes scarcely rise to one per cent., in wheat flour the range may be set down at from nine to thirteen per cent. Again, the non-nitrogenous principles are as about seventy-five per cent. in wheat flour against fifteen or sixteen in potatoes. In short, whilst potatoes supply only twenty per cent. of heat-forming and nutritious principles, taken together, wheat supplies more than seventy per cent. of the former, and more than ten of the latter. The value of wheat to potatoes, therefore, is at least four to one: or, if wheat sells at fifteen shillings (sterling) per cwt., potatoes to be equally cheap ought to sell at between three and four shillings."

The preceding results, for which I am principally indebted to Dr. Daubeny, Professor of Chemistry at Oxford,* show that unless a great change occurs in the culture of the potato, there must be an increased demand for other kinds of farinaceous food. And it is worthy of notice that while this blight is one of the causes which bring to our shores the starving popula-

* A lecture on the nutritive value of different articles of food, by C. Daubeny, M. "Gardeners' Chronicle" (London), January 20th, 1849, p. 37.

tion of Europe, the raising of the cereals not only furnishes profitable employment to the emigrant, but enables him to make the best return to those who are still obliged to remain.

Adaptation of the Soil and Climate of the United States to the Culture of the Cereals.

That the soil and climate of many portions of the United States are well adapted to the cultivation of the more important cereals, is fully shown by the results of all the researches which have thus far been prosecuted. I have indeed seen it asserted that the climate of England is the best for the cultivation of wheat, and preferable to any in our country; its humidity being the peculiarity to which this superiority is ascribed.* But this is undoubtedly the testimony of a too partial witness. A recent statement by an English author is the result of a more correct knowledge of the facts. He acknowledges that there is no ground for the expectation which has been entertained concerning the advantageous growth of maize in England. "Nor is ours," says he, "the most favorable country for wheat, but skill in husbandry has overcome great difficulties."† The mistake on this subject may have originated from the occurrence of a larger and plumper grain in the more humid climate; but analysis shows that the small grain raised in the hotter and drier air oftentimes greatly surpasses the former in its nutritive value.

Russia is said to be the great rival of this country in the growth of wheat, but I think it doubtful whether she possesses superior natural advantages; and I am sure she will find it difficult to compete with the industry and skill which here characterize the operations of husbandry, and the manufacture and shipment of breadstuffs.

Export of Sophisticated and Damaged Flour.

It is a matter of deep regret that circumstances have occurred which must have a most injurious influence upon the trade in breadstuffs between this country and Great Britain. I refer to the mixtures of damaged, inferior and good kinds of flour, which it appears on authentic testimony have been largely exported during the past year. Whether this fraudulent operation, which is said to have been principally confined to New York, is the result of the change in the inspection laws, as some assert, I am unable to say. But it requires no great foresight to predict that, if continued, it will create a distrust of our breadstuffs in foreign ports which it will be very difficult to remove. It cannot but excite the indignation of the many honorable dealers, that the unworthy cupidity of a few individuals should lead to such disastrous consequences.

I have as yet been unable to obtain samples of these sophisticated flours, and the only information which I have in regard to them is the general fact above stated, and concerning the truth of which there can be little doubt. No means should be left untried to devise some mode by which these frauds can be easily and certainly detected.

* Transactions of the New York State Agricultural Society, 1849, p. 646. The statement here referred to was made by Mr. Slocum.

† A lecture "On the Geographical Distribution of Corn Plants," by the Rev. E. Sidney—Proceedings of the Royal Institution (London), May 18th, 1849.

Injury sustained by Breadstuffs during their Transport and Shipment.

During the past year, I have had abundant means of determining the nature of the injuries which are often sustained by our breadstuffs in their transport from the particular districts in which they are grown and manufactured to our commercial depots, and in their shipment to foreign ports. As this is one of the most important points connected with these researches, I have devoted much time to its investigation. From the results of numerous analyses, I think it may be safely asserted, that of the wheat flour which arrives in England from various ports of the United States, a large proportion is more or less injured during the voyage. The same remark may be made in regard to many of the samples sent from the Western States to the city of New York. Their nutritive value is considerably impaired, and without more care than is usually exercised, they are entirely unfit for export.

In my former report, I adverted to one of the great causes of the deterioration which our breadstuffs often suffer during their transport and shipment. This was the undue proportion of the great disorganizing substance, water, under the influence of what usually occurs, viz., an elevation of temperature above the ordinary standard. My recent investigations have served only to strengthen these views. There is no doubt that these are the conditions which cause the change of the non-nitrogenous principles into acids (the lactic or acetic), while a portion of the gluten is thus also consumed.

I have tried a series of experiments in reference to the action of moisture upon various samples of wheat and wheat flour. The samples were placed for twelve hours in the oven of a bath with a double casing, containing a boiling saturated solution of common salt, the temperature of which was about 220° Fahr. Subjected to this test,

100 grains of	Milwaukie wheat	lost	12.10	grains.
" "	Guilderland (Holland) wheat	lost	9.35	"
" "	Polish Odessa red wheat	"	10.55	"
" "	Soft Russian wheat	"	8.55	"
" "	Kubanka wheat	"	8.15	"

After an exposure of the dried samples to the air for two or three days, they increased in weight from one to three grains in the hundred originally employed.

Nineteen different samples of wheat flour, which lost by exposure to the above heat from ten to fourteen grains in the one hundred, when similarly exposed to the air for eighteen hours, again increased in weight from 8.40 to 11.50 in the hundred grains originally employed.

These experiments show, what might indeed have been predicted as to the general result, that wheat in grain, if not less liable to injury than flour, yet if once properly dried, suffers much less from a subsequent exposure to air and moisture.

It is now ascertained that in presence of a considerable proportion of water, wheat flour under the influence of heat undergoes a low degree at least of lactic fermentation, which will account for the *souring* of the ordinary samples when exposed to warm or humid climates. The same result will inevitably follow from their careless exposure in the holds of vessels. That this is particularly the case with many of the cargoes of wheat flour shipped to Great Britain, there is little reason to doubt. This may be partly owing to the great humidity of the English climate, as the deterioration is observed as well in the flour which is the produce of that country as in that which is received from abroad.

It is stated by Mr. Edlin, quoted in an article on Baking, in the *Encyclopædia Britannica*, that, "as a general rule, the London flour is decidedly bad. The gluten generally wants the adhesiveness which characterizes the gluten of good wheat."

I have observed that, in the analyses of some of the samples of damaged flour, the proportions of what is set down under the heads of glucose and dextrine are unusually large. This is perhaps due to the change produced in the starch by the action of diastase, and which may under certain circumstances be formed in wheat flour. It would seem, according to M. Guerin, that starch may thus be acted on even at slightly elevated temperatures. In one of his experiments, at a temperature no higher than 68° Fahr., a quantity of starch, at the end of twenty-four hours, was converted into syrup, which yielded seventy-seven per cent. of saccharine matter.*

It may be thought that I have overrated the importance of this subject, but it is believed that a careful examination of the facts will relieve me from this charge. I am now satisfied that, if the proportion of water in our exported breadstuffs could be reduced to about five or six per cent., one of the great causes of complaint in regard to them would be completely removed.

Kiln-drying of Breadstuffs, and exclusion of air.

The injury which our breadstuffs sustain by the large proportion of water can of course be prevented only by careful drying before shipment, and by the employment of barrels rendered as impervious as possible to the influence of atmospheric moisture.

In my first report, I have spoken favorably of the process of drying by steam, according to the plan patented by Mr. J. R. Stafford. I still think this mode possesses great advantages over those previously followed, and which almost always injured the quality of the grain or flour: but from some trials which I have made during the past year, it is inferred that the exposure to the heat is perhaps usually not sufficiently prolonged to answer the purpose intended by the operation. I have often observed that samples of wheat flour, after being exposed to the heat of the salt water-bath oven (220° Fahr.) for two or three hours, lost weight by a further continuance of the heat. An apparatus has been patented by Mr. J. H. Tower, of Clinton, N. Y., consisting of a cylinder of square apartments or tubes, into which the grain or flour is introduced, and subjected to heat while in rapid revolution. I examined samples which had been subjected to this operation, and ascertained that wheat flour, originally containing 14.80 per cent. of water, had the proportion reduced to 10.25 per cent., while in wheat the proportion of water was reduced from 14.75 to 8.55 per cent.

Now it is probable that by either of the above modes, and perhaps by many others, the various kinds of breadstuffs may be brought to that degree of dryness which, with ordinary care, shall protect them from subsequent injury; but in order to secure this advantage, the operation must be carefully performed, and experiments must be made to ascertain how long an exposure to heat is necessary to bring the sample to the proper degree of dryness, and to determine whether in any respect its quality is impaired. It has already been stated that absolute desiccation is not necessary, even were it attainable; but any process in order to be effective should reduce the proportion of water to about six, or at most, seven per cent.

* Boussingault's Rural Economy, American edition, pp. 85 and 86.

I have heretofore adverted to the great care employed in the drying of grain in various foreign countries, and to which the preservation of it for a great number of years is to be ascribed.

The operation is not conducted in the hurried manner which is here thought to be so essential, but is continued long enough to effect the intended object. Thorough ventilation, as well as the proper degree of drying, and which is equally important, is thus secured.

It is said that in Russia the sheaves of wheat, carried into the huts, are suspended upon poles and dried by the heat of the oven. The grain shrinks very much during this process, but it is supposed to be less liable to the attacks of insects, and preserves its nutritive qualities for many years. During the winter, it is sent to market.*

With all the necessary attention which may be paid to the proper drying of our breadstuffs intended for export, another point is of equal importance, viz., the shipment in vessels rendered as impervious as possible to the influence of atmospheric moisture. For however carefully and thoroughly the drying, especially of wheat flour or maize meal, may have been performed, it will be nearly useless if the shipment is afterwards made in the barrels commonly employed.† And it is very certain that the transport and shipment of grain in bulk, as usually conducted, are attended with great loss. This difficulty might be removed at a trifling expense by adopting the plan suggested in the preceding report, and to which I would again respectfully call the attention of those who are engaged in this branch of trade.

I might here adduce a mass of testimony showing the importance of the matters just referred to, but will only advert to the following statements, which, although made in allusion principally to maize, are equally applicable to our other breadstuffs. Maize meal, if kept too long, "is liable to become rancid, and it is then more or less unfit for use. In the shipments made to the West Indies, the meal is commonly kiln-dried, to obviate as much as possible this tendency to rancidity." "When ground very fine, maize meal suffers a change by exposure to the air. It is oxygenated. It is upon the same principle that the juice of an apple, after a little exposure to the air, is oxygenated, and changes its character and taste. If the flour could be bolted *in vacuo*, it would not be changed." "Intelligent writers speak of the necessity of preparing corn for exportation by kiln-drying as indispensable. Without that process, corn is very liable to become heated and musty, so as to be unfit for food for either man or beast. The kiln-dried maize meal from the Brandywine Mills, &c., made from the yellow corn, has almost monopolized the West India trade. This process is indispensable, if we export maize to Europe. James Candy says that from fifty years experience he has learned the necessity of this process with corn intended for exportation." "I have often found the corn from our country when it reached its destination, ruined by heating on the voyage. It had become musty and of little or no value. Kiln-drying is absolutely necessary to preserve it for exportation. We must learn and practice the best mode of kiln-drying it.‡

* The Czar, his Court and People. By John S. Maxwell, p. 272.

† Zenas Coffin, one of the oldest whalemen in Nantucket, states that corn meal in tight rum puncheons when sent to the West Indies, will keep sweet, while in common flour barrels it will spoil. Report of the Commissioner of Patents for 1847, p. 133.

‡ From remarks of Col. Skinner, and others, at a meeting of the American Institute, held in April 1846. Transactions of American Institute, 1846, p. 509 *et seq.*

The Nutritious Value of the "whole meal" of Wheat, as compared with that of the Fine Flour.

The question, whether what is called the whole meal of wheat, or that which is obtained by the mixture of the bran, contains more nutritious matter than the fine flour, is one of great importance. In my former report, I adverted to the statement made in regard to it by Professor J. F. W. Johnston, and which seemed to be almost conclusive in favor of the superior value of the whole meal. During the past year, however (1849), M. Eng. Peligot, an eminent French chemist, in an elaborate article "On the Composition of Wheat," to which more particular reference will be made hereafter, combats the opinion that the bran is an alimentary substance. He observes that "the difficulty of keeping the bran in flour intended for the manufacture of bread of good quality, appears to result much less from the presence of the proportion of cellulose (one of the constituents of woody matter) contained in wheat than that of the fatty matter. This is found in the bran in a quantity at least triple of that which remains in the flour, and the bolting separates it from the ground wheat not less usefully than the cellulose itself."*

M. Millon objects entirely to the views of M. Peligot on this point, and states some facts which are especially worthy of consideration. He asserts that, according to the views of the last-named chemist, the separation at most of one part of fatty matter sacrifices fifteen, twenty, and even twenty-five per cent. of substances which are of the highest nutritive value. This abstracts from wheat, for the whole amount raised in France, the enormous sum of about two hundred millions of pounds annually.

It seems that in France the question whether the bolting of flour is advantageous has always been decided in the most arbitrary manner. An ordinance of Louis XIV., issued in 1658, prohibited, under a very heavy penalty, the regrinding of the bran and its mixture with the flour; this, with the mode of grinding then in use, caused a loss of more than forty per cent.†

In large cities and elsewhere, there seems for some time to have been a growing prejudice against the use of brown bread; and it is said that now nearly all the peasantry of France bolt their flour. The increase of this practice, according to M. Millon, threatens the nation with an annual loss of from two to three hundred millions of francs. If the bran was entirely valueless, there would be a loss of more than one million a-day.‡

It is quite difficult to determine the precise amount of bran which may have been removed from wheat, for various samples contain such a different proportion of bran that in the one case a removal of ten per cent. leaves more bran in the flour than a bolting of five per cent. in another.

The following are the results of an analysis of bran by M. Millon; the sample being from a soft French wheat grown in 1848:—

Starch, dextrine and sugar,	53.00
Sugar of liquorice,	1.00
Gluten,	14.90
Fatty matter,	3.60
Woody matter,	9.70
Salts,	.50
Water,	13.90
Incrusting matter and aromatic principles (by difference),	3.40
	100.00

* Comptes Rendus des Séances de L'Académie des Sciences, February 5th, 1849.

† Comptes Rendus, February 19th, 1849.

‡ Ibid.

The conclusion to be drawn from this analysis is, that bran is an alimentary substance. If it contains six per cent. more of woody matter than the rough flour, it has also more gluten, double that of fatty matter, besides two aromatic principles which have the perfume of honey, and both of which are wanting in the fine flour. Thus by bolting, wheat is impoverished in its most valuable principles, merely to remove a few hundredths of woody matter.

The economical suggestion which springs from these views is, that the bran and coarse flour should be reground and then mixed with the fine flour. Millon states that he has ascertained, by repeated experiments, that bread thus made is of superior quality, easily worked, and not subject to the inconvenience of bread manufactured from the rough flour, such as is made in some places, and especially in Belgium.

Opinions similar to those above noticed are entertained by Professor Daubeny. "The great importance attached to having bread perfectly white is a prejudice," says he, "which leads to the rejection of a very wholesome part of the food, and one which, although not digestible alone, is sufficiently so in that state of admixture with the flour in which nature has prepared it for our use." After quoting the remarks of Professor Johnston on the same side of the question, he adds, "that according to the experiments of Magendie, animals fed upon fine flour died in a few weeks, whilst they thrived upon the whole meal bread." Brown bread, therefore, should be adopted, not merely on a principle of economy, but also as providing more of those ingredients which are perhaps deficient in the finer parts of the flour.*

The remarks of Dr. Robertson may also be here introduced. "The advantage," says he, "of using more or less of the coverings of the grain in the preparation of bread has often been urged on economical principles. There can be no doubt that a very large proportion of nutritive matter is contained in the bran and the pollard; and these are estimated to contain about one-fifth part of the entire weight of the wheat grain. It is, unquestionably, so far wasteful to remove these altogether from the flour; and in the case of the majority of people, this waste may be unnecessary, even on score of digestibility."†

Fig. 1.

This subject can also be rendered apparent to the eye. If we make a cross section of a grain of wheat, or rye, and place it under the microscope, we perceive very distinct layers in it as we examine from without inwards. The outer of them belong to the husk of the fruit and seed (*a*, in the annexed cut), and are separated as bran, in grinding. But the millstone does not separate so exactly as the eye may by means of the microscope, not even as accurately as the knife of the vegetable anatomist, and thus with the bran is removed also the whole outer layer of the cells of the nucleus, and even some of the subjacent layers. A glance at the figure shows, however, at once, that the contents of the outer cells of the nucleus (*b*) are very different from those of the inner (*c*); for while the latter enclose a great quantity of starch and very little nitrogenous matter, in the outer layer of cells we find only the latter substance, which in the cereal grains usually receives the name of gluten. Thus the anatomical investigations of one of these corn grains at once explains why bread is so much the less nutritious, the more carefully the bran has been separated from the meal.*

* Gardeners' Chronicle (London), January 27th, 1849, p. 53.

† A Treatise on Diet and Regimen, by Wm. Henry Robertson, M. D., vol. i. p. 183.

There can therefore be little doubt that the removal of the bran is a serious injury to the flour; and I have presented the above array of evidence on this point, in the hope of directing public attention to it here, as has been done in various foreign countries.

After this, it will easily be inferred that I am not disposed to look with much favor upon the plan proposed by Mr. Bentz for taking the outer coating or bran from wheat and other grains previously to grinding.† Independently of the considerations which have already been presented, it is far from being proved, as this gentleman asserts, that the mixture of the bran with the meal which results from the common mode of grinding is the chief cause of the *souring* of the flour in hot climates. On the contrary, the bran is perhaps as little liable to undergo change as the fine flour, and then the moistening to which, as I am informed, the grain is subjected previously to the removal of the husk, is still further objectionable, and must be followed by a most carefully conducted process of kiln-drying.

Nutritious Properties of various articles of Food.

There seems to be some difference of opinion in regard to the nutritious properties of various kinds of food. It is generally, however, agreed that those which contain the largest proportion of nitrogenous matters are the most nutritious. It is on this account that haricots, peas and beans, form, in some sort, substitutes for animal food. Tubers, roots, and even the seeds of the cereal grasses, are but moderately nutritious. If we see herbivorous animals fattening upon such articles, it is because, from their peculiar organization, they can consume them in large quantities. It is quite doubtful whether a man doing hard work could exist on bread exclusively. The instances which are given of countries where rice and potatoes form the sole articles of food of the inhabitants, are believed to be incomplete. Boussingault states that in Alsace, for example, the peasantry always associate their potato dish with a large quantity of sour or curdled milk; in Ireland with buttermilk. "The Indians of the Upper Andes do not by any means live on potatoes alone, as some travelers have said they do: at Quito, the daily food of the inhabitants is *lorco*, a compound of potatoes and a large quantity of cheese. Rice is often cited as one of the most nourishing articles of diet. I am satisfied, however, after having lived in countries where rice is largely consumed, that it is anything but a substantial, or, for its bulk, nutritious article of sustenance."‡ These statements are further confirmed by the observations of M. Lequerri, who, during a long residence in India,

* The Plant: a Biography; by M. J. Schleiden, M. D., Professor of Botany in the University of Jena. English translation, p. 54.

† Transactions of the New York State Agricultural Society for 1847, p. 190. In this communication, Mr. Bentz does not describe the process which he adopts, but enumerates some of its supposed advantages.

‡ Rural Economy, Amer. edition, p. 409.

paid particular attention to the manners and customs of the inhabitants of Pondicherri. "The food," says he, "is almost entirely vegetable, and rice is the staple; the inferior castes only ever eat meat. But all eat *kari*, an article prepared with meat, fish, or vegetable, which is mixed with the rice, boiled in very little water. It is requisite to have seen the Indians at their meals to have any idea of the enormous quantity of rice which they will put into their stomachs. No European could cram so much at a time; and they very commonly allow that rice alone will not nourish them. They very generally still eat a quantity of bread."*

In regard to the proportion of nutritious matter contained in grains of various kinds, it may be remarked that the tables which have been constructed as the results of various experiments are liable to an objection, which will be more particularly adverted to under another head. For example, two substances, by the process of ultimate analysis, may exhibit the same proportion of nitrogenous matter, and still differ very materially in their value as articles of food. Much depends on the digestibility of the form in which this matter is presented to the digestive organs. A strong illustration is afforded in the case of hay, the proportion of nutritive matter of which, about 9.71, would certainly not represent its power of affording nourishment to the human system. It is in truth quite impossible to arrive at any other than approximative results from the operations of chemistry, as to the amount of nutriment contained in a given quantity or weight of any article of food.†

It is perhaps not irrelevant to notice in this place some of the researches which have recently been made upon fermentation, and particularly its effects in the manufacture of bread. It appears that when this process is brought about by the addition of yeast or leaven to the paste or dough, the character of the mass is materially altered. A larger or smaller proportion of the flour is virtually lost. According to Dr. William Gregory, the loss amounts to the very large proportion of one-sixteenth part of the whole of the flour. He says, "To avoid this loss, bread is now raised by means of carbonate of soda, or ammonia and a diluted acid, which are added to the dough, and the effect is perfectly satisfactory. Equally good or better bread is obtained, and the quantity of flour which will yield fifteen hundred loaves by fermentation, furnishes sixteen hundred by the new method, the sugar and fibrin (gluten) being saved."‡

Another author, Dr. R. D. Thomson, states, as the result of his experiments upon bread produced by the action of hydrochloric acid upon carbonate of soda, "that in a sack of flour there was a difference in favor of the unfermented bread to the amount of thirty lbs. thirteen ounces, or in round numbers, a sack of flour would produce one hundred and seven loaves of unfermented bread, and only one hundred loaves of fermented bread of the same weight. Hence it appears that in the sack of flour by the common process of baking, seven loaves, or six and a half per cent. of the flour, are driven into the air and lost."§

The only objection to the general introduction of this process seems to be the degree of care and accuracy required in properly adjusting the respective qualities and quantities of acid and alkali, and which could seldom be attained even by those who are largely engaged in the manufacture of bread.

* Quoted by Boussingault, Rural Economy, Amer. edition, p. 410.
† A Treatise on Diet and Regimen, by Wm. Henry Robertson, M. D., vol. i. p. 140.
‡ Outlines of Chemistry, p. 352.
§ Experimental Researches on the Food of Animals, &c., p. 183.

I cannot leave this subject without adverting to a practice which has prevailed in England and France, and perhaps also in this country, of steeping wheat before sowing it in solutions of arsenic, sulphate of copper, and other poisonous preparations.

The result has been that injurious effects have often followed both to those who are employed in sowing such grain, and to those who have used the bread manufactured from it. The great importance of the subject led to the appointment of a commission at Rouen, in France, in December, 1842, having for its object to determine the best process of preventing the smut in wheat, and to ascertain whether other means less dangerous than those above noticed were productive of equally good results. The labors of this commission extended over the years 1843-'44-'45, and the experiments were repeated two years following on the farm of Mr. Fauchet, one of the commission, at Boisquilaume, in the department of the Seine Inferieure.

The results arrived at by this commission are—1st. That it is not best to sow seed without steeping. 2d. That it is best to make use of the sulphate of soda and lime process, inasmuch as it is more simple and economical, in no way injurious to the health, and yields the soundest and most productive wheat. 3d. That the use of arsenic, sulphate of copper, verdigris, and other poisonous preparations, should be interdicted by the government.*

Composition of Wheat and Wheat Flour, and the various modes of determining their Nutritive Value.

In my former report, it was stated that the analyses of the various samples of wheat, the results of which were there given, had been chiefly directed to the determining the amount of rough *gluten* which they contained. My reasons for adopting this plan and the arguments in favor of its general accuracy as compared with other modes of analysis, and especially that by which the ultimate composition is ascertained, were also detailed. A more full examination of this subject has served only to strengthen the opinion already expressed, that for the great purpose to be answered by these researches, the process which I have adopted is, to say the least, as free from objection as any other, and if carefully and uniformly carried out, will truly represent the relative values of the several samples of wheat flour. As this is a matter of much consequence in a practical point of view, I trust I shall be excused for introducing some additional facts in regard to it.

The term *gluten* was originally applied to the gray, viscid, tenacious and elastic matter which is obtained by subjecting wheat flour to the continuous action of a current of water. But it appears that this is a mixture of fibrine and caseine, with what is now called *glutine*, and a peculiar oily or fatty matter. Now these substances may be separated from each other, but the processes employed for this purpose are tedious, and to insure accuracy the various solvents must be entirely pure—a point which, especially in the case of alcohol and ether, is not ordinarily easy to be attained. This will be rendered still more evident by a reference to a French process which will hereafter be noticed.

But were it much less difficult in every case accurately to separate the

* Gardeners' Chronicle (London), January 6th, 1849, pp. 10 and 11.

constituents of gluten, it would not in my opinion be of the least practical utility. It is to the peculiar mechanical property of this gluten that wheat flour owes its superior power of detaining the carbonic acid engendered by fermentation, and thus communicating to it the vesicular spongy structure so characteristic of good bread.* It may also be added, that the results of more than one hundred trials have satisfied me that a diminution or loss of elasticity in the gluten is the surest index of the amount of injury which the sample of flour has sustained. Whether, therefore, the sample contains a certain proportion of nitrogen, or whether it contains albumen, fibrine and caseine in sufficient quantity, it may still want the very condition which is essential to the manufacture of good bread. My objection, therefore, to the mere determination, however accurate, of the proportion of nitrogen contained in wheat flour, or of the various principles which form the gluten, is that it does not represent the value of the various samples for the only use to which they are applied, viz.—the making of bread. The remarks of Mulder, the celebrated Dutch chemist, upon the subject of manures, are so applicable to this point, that I cannot refrain from quoting them. "It has," he says, "become almost a regular custom to determine the value of manures by the quantity of nitrogen they yield by ultimate analysis. This method is entirely erroneous; for it is based upon the false principle, that by putrefaction all nitrogenous substances are immediately converted into ammonia, carbonic acid, and water! But these changes sometimes require a number of years. Morphine, for example, is prepared by allowing opium to putrefy; and the process for preparing leucin, a substance which contains 10.72 of nitrogen, is to bring cheese into putrefaction. Cheese, therefore, does not perhaps in a number of years resolve itself into carbonic acid, ammonia, and water, but produces a crystalline substance, which contains no ammonia. Hence the proportion of nitrogen yielded by manures is not a proper measure of their value, and therefore this mode of estimating that value ought to be discontinued."†

We infer, therefore, that the proportion of nitrogen furnished by food of various kinds is not the true measure of their nutritious value, and cannot for practical purposes take the place of that process by which the amount of rough gluten is determined.

No better illustration can be given of the uncertainty which attends the inferences drawn from the ultimate composition, than the fact heretofore stated in regard to hay, the nutritive value of which is placed in the tables containing the results of these analyses, at a figure nearly the same as that of ordinary wheat flour.‡

In the paper on the "Composition of Wheat," by M. Peligot,§ to which I have already referred, the author gives the results of the various analyses which he has made, and details the process he adopted.

Aware of the complex and difficult nature of the examination as conducted by him, he seems to doubt in regard to some of the results given in his table. In the fourteen samples which he analyzed, the proportion of water ranges from 13.2 to 15.2, which is a rather higher average than is yielded by our

* Experimental Researches on the Food of Animals, &c., by R. D. Thomson, M. D., p. 150.

† Chemistry of Vegetable and Animal Physiology, translated by Prof. J. F. W. Johnston, p. 684.

‡ See Dr. R. D. Thomson's Experimental Researches on the Food of Animals, &c.

§ Comptes Rendus, February 5th, 1849.

American samples, especially those which have not been shipped across the Atlantic. Of the nitrogenous matter, soluble and insoluble, the proportions range from 9.90 per cent. to 21.50 per cent.; the former being from a sample of very soft and white French wheat; the latter from a very hard wheat with long grains, from Northern Africa, cultivated at Verrières. Another sample from Egypt yielded 20.60 per cent. of these nitrogenous matters, both of which are very remarkable proportions.

In describing the process for ascertaining the amount of insoluble nitrogenous matters, this author adverts to their estimation either by the quantity of nitrogen gas furnished, or of ammonia formed, the last being preferred for substances, which, like wheat, contain only a few hundredths of nitrogen. The results which he obtained by this method were compared with those yielded by the direct extraction of the gluten by softening the farina under a small stream of water. "These results," says he, "differ but little from each other when we operate upon wheat in good condition, although the gluten which we thus obtain holds some starch and fatty matter, while the starch which is carried away by the water contains also some gluten." The loss and gain, as I have already explained, and as has been proved by these and other comparisons, are nearly balanced, and the amount of rough gluten will therefore afford a fair exhibit of that of the insoluble nitrogenous matters in this grain.

The salts in the samples of wheat analyzed by M. Peligot, were either wanting or were in small proportion; while the amount of fatty matter ranged from 1.00 to 1.80 and 1.90 per cent.

These results agree very well with those which I have obtained. But it is probable that the proportion is liable to great variation, inasmuch as it is inferred that the fatty matter originates from starch through its exposure to the general deoxidizing influence which prevails in plants.*

There are also many difficulties attending the accurate determination of this matter, and which are probably the cause of the higher proportion often given. It is properly remarked by M. Peligot that the ether employed in this process should be free from water, and that the flour ought also to be very dry. By neglecting these precautions, we separate not only the fatty matter, but also a certain amount of matters soluble in the water, which is furnished as well by the wheat as by the ether.

It would not, I think, be difficult to point out some incorrect views entertained by this chemist, and more especially those which relate to the fatty matter. Some of his processes for the separation of various substances, if not faulty, require so many conditions for success as to render the results, at least in other hands, exceedingly uncertain.

But the capital error which he has committed is that concerning the bran, already adverted to, which he considers injurious to the flour, chiefly in consequence of the large proportion of fatty matter which it contains.

In regard to the soluble nitrogenous matter usually called albumen, from its resemblance to the animal substance of the same name, I have to remark, that in my trials the proportion has been found to be considerably less than that often given in tables of the composition of wheat. In one sample it was found to be as low as 0.15 per cent., in another it did not rise above 0.20 per cent. The amount was usually so inconsiderable,

* Mulder's Chemistry of Vegetable and Animal Physiology; English translation, p. 815.

that I did not think it worth while to retard the progress of the work by following out processes which could add little to the utility of these investigations.

Although much time and labor have been expended upon the analyses of the ash of plants, I have but slight confidence in the results heretofore given. The difficulties which attend the obtaining the ash in a proper condition, and the fact that the products of all the organs and parts of the plants have been analyzed together, must necessarily impair the accuracy of the experiments, and render the inferences drawn from them of uncertain value. Much, indeed, I may say almost everything, still remains to be done in this department of agricultural chemistry.

Weight of Wheat as an Index to its Value.

Much has been said in regard to the relative weights of the bushel of wheat of different varieties or under different modes of culture.

As ordinarily determined, this weight ranges from fifty-six to sixty-five or sixty-six pounds, being in a few cases set down somewhat higher. It is said also that the bushel of wheat weighs less in some years than it does in others, and that the difference often amounts to two, or three, or even four pounds. Though this may seem of comparatively little consequence for a few bushels, yet, for the aggregate of the wheat crop of the United States, or for a State, or even a county, it makes a great difference. Thus, were we to estimate the product of one year in the United States at one hundred and ten million bushels, weighing fifty-six pounds to the bushel, and another year at one hundred and eight million bushels, weighing sixty-two pounds, the difference in favor of the latter, though the least in quantity, would amount to five hundred and thirty-six million pounds in weight, or more than one million and a quarter of barrels of flour.*

It may be remarked, however, that it is not after all so easy to determine with accuracy the weight of a bushel of wheat, nor to decide upon the circumstances which have an influence in increasing the density of a grain of wheat. If the microscopical representation given on page 56 is to be relied on, it is probable that the increase in the density of wheat depends upon the increase in the proportion of gluten. I have found in several cases that, the proportion of water being the same, those samples of wheat which contain the largest proportion of gluten exhibit the highest specific gravity, or in other words, will yield the greatest number of pounds to the bushel. But the weight of wheat will be influenced by the proportion of water which it contains; the drier the grain, the greater is its density; a fact which may account for the difference which has been observed in the weight of wheat in different seasons. If this is the cause, the calculation above given in reference to the United States is fallacious—but if the amount of gluten is *actually*, instead of *relatively*, increased by peculiarities in seasons, it is no doubt correct.

I have devised a series of experiments to test the accuracy of the statements made upon this point, but have not yet had leisure to complete them.

General Conclusions from the Analyses of Wheat Flour.

The large number of analyses which I have made, and the uniformity of the processes pursued, enable me to draw some general conclusions which it may be useful to present in a connected form.

* Report of the Commissioner of Patents for 1847, p. 112.

1. In the samples from the more northern wheat-growing States, there seems to be little difference in the proportion of nutritive matter that can be set down to the influence of climate. Thus, the yield of the wheat from Michigan, Wisconsin and Iowa, is scarcely inferior to that from New York, Indiana, and Illinois, although the two latter are somewhat farther south. Local causes, and more especially the peculiarities of culture and manufacture, have more influence, within these parallels of latitude, than the difference of mean temperature.

2. The samples from New Jersey, lower Pennsylvania, the southern part of Ohio, Maryland (probably Delaware), Virginia, the Carolinas, and Georgia,* contain less water and more nutritive matter than those from the States previously enumerated. That the samples from Missouri, which is included within nearly the same parallels of latitude as Virginia, do not exhibit so high an average of nutritive matter as those from the latter State, must be ascribed principally to a want of care in the management of the crop, and perhaps also in the manufacture of the flour. Virginia flour, for obvious reasons, maintains a high reputation for shipment.

3. The difference in the nutritive value of the various samples of wheat depends greatly upon the variety, and mode of culture, independently of climate. The correctness of the former statement is shown by the much larger proportions of gluten yielded by many of the samples of *hard* wheat from abroad, the Oregon wheat in Virginia, and a variety of Illinois wheat, &c. And in regard to the effect of particular modes of culture, the various analyses of Boussingault may be referred to, and that in my table of a sample from Ulster county, New York.

4. The deterioration of many of the samples of wheat and wheat flour arises in most cases from the presence of a too large per centage of water. This is often the result of a want of proper care in the transport, and is the principal cause of the losses which are sustained by those who are engaged in this branch of business.

5. There seems to be little doubt that a considerable portion of the wheat and wheat flour, as well as of other breadstuffs, shipped from this country to England, is more or less injured before it reaches that market. It is also shown that this is mostly to be ascribed to the want of care above noticed, and to the fraudulent mixture of good and bad kinds. The remedy in the former case is the drying of the grain or flour before shipment, by some of the modes proposed, and the protection of it afterwards as completely as possible from the effect of moisture. The frauds which are occasionally practiced should be promptly exposed, and those who are engaged in them held up to merited reproach.

6. It has been fully shown by the results of many trials that the flour obtained by the second grinding of wheat, or the whole meal, contains more gluten than the fine flour. Hence the general use of the latter, and the entire rejection of the bran, is wasteful, and ought in every way to be discouraged.

7. It cannot but be gratifying to us that the average nutritive value of the wheat and wheat flour of the United States is shown by these analyses to be fully equal to, if not greater than, that afforded by the samples produced in any other part of the world. And it will, in my opinion, be chiefly owing to a want of proper care and of commercial honesty, if the great advantages

* I have had no opportunity of analysing samples of flour from the South-Western States, and therefore cannot extend this comparison to them.

which should accrue to this country from the export of these articles are either endangered or entirely lost.

Results of the Analyses of Wheat and Wheat Flour, made during the year 1849.

NEW JERSEY.

I. Wheat flour from "Country Mills," New Jersey; not very finely ground nor very white. (From Messrs. Hoagland & Campbell, New Brunswick, N. J.)

Water		12.75
Gluten	12.40	12.55
Albumen	0.15	
Starch (by difference)		65.95
Glucose, dextrine, &c.		8.10
Bran		0.65
		100.00

The gluten was very elastic and of excellent quality. One of the best Northern samples.

II. West Jersey wheat flour (1849). (From Mr. John H. Janeway, of Philadelphia.)

Water	12.80
Gluten and albumen	11.32
Starch (by difference)	69.48
Glucose, dextrine, &c.	5.90
Bran	0.50
	100.00

The gluten in this sample was of fair quality.

III. Wheat flour from white wheat raised by John S. Voorhees, at three Mile Run, N. J., slightly mixed with red wheat from the same vicinity; ground at Letson's Mill, New Brunswick, N. J.

Water	11.55
Gluten and albumen	12.60
Starch (by difference)	66.85
Glucose, dextrine, &c.	8.50
Bran	0.50
	100.00

This flour, though not very white, was of fine quality, and well suited for the manufacture of bread.

PENNSYLVANIA.

IV. Wheat flour from the Canal Mill, New Brunswick, N. J., said to be from Pennsylvania wheat. (From Messrs. Hoagland and Campbell, New Brunswick.)

Water	11.90
Gluten and albumen	13.16
Starch	66.20
Glucose, dextrine, &c.	7.25
Bran	0.75
	99.26

This flour was of excellent quality. Indeed, it is one of the richest in gluten of all the Northern samples. The precise place of the growth of the sample I have been unable to learn.

V. Wheat from ship Arabella, from Philadelphia, 16th November, 1848, arrived in Liverpool, January 3d, 1849. (From the U. S. Consul at Liverpool.) The grain was large and plump, with a thin husk. It was ground in a mill and passed through a fine bolting-cloth sieve. The fine flour gave

Water	13.35
Gluten and albumen	12.73
Starch (by difference)	66.90
Glucose, dextrine, &c.	6.50
Bran	0.52
	100.00

VI. Wheat flour obtained from the above sample by passing the portion which remained on the sieve a second time through the bolting-cloth sieve.

Water	13.35
Gluten and albumen	14.72
Starch, glucose, dextrine, &c. (by diff.)	71.28
Bran	0.65
	100.00

In both the preceding samples, the gluten was of a fair quality. The last analysis was conducted for the purpose of comparing the product of the first and second grinding. This wheat contained an unusually large proportion of water, viz., 13.38 per cent.

NEW YORK.

VII. Wheat flour from wheat grown on the Pelham Farm, Ulster Co., described in the Report of the Commissioner of Patents for 1847, page 117, as being very rich in gluten. (From R. L. Pell, Esq., Ulster Co.)

Water	10.79
Gluten and albumen	13.17
Starch	67.74
Glucose, dextrine, &c.	7.60
Bran	0.70
	100.00

This sample is represented as having been obtained from wheat, raised by particular management, which weighed sixty-five pounds per bushel. It is said that Dr. Gardner obtained eighteen per cent. of gluten from this flour; but the proportion above given was the highest of two trials, the other yielding a few hundredths of a grain less. The excess of nearly five per cent. must, I think, be due to imperfect desiccation. In all my analyses, the gluten was subjected to the heat of the salt water oven for from eight to twelve hours.

VIII. Wheat flour, labeled "Pure Genesee," obtained in New York. (From Messrs. James Bishop & Co., N. Y.)

Water	13.20
Gluten and albumen	11.05
Starch, glucose, dextrine, &c. (by diff.)	75.20
Bran	0.55
	100.00

This flour was of a good quality; gluten elastic, flowing by heat. The process was not followed out to the end.

OHIO.

IX. Wheat flour labeled "Ohio Fine," obtained in New York. (From Messrs. James Bishop & Co.)

Water	12.85
Gluten and albumen	12.25
Starch, glucose, dextrine, &c. (by diff.)	73.90
Bran	1.00
	100.00

The gluten of this flour was only of medium quality. As I had previously analyzed several specimens from this State, I did not follow out the process to the end.

X. Wheat flour labeled "Ohio Superfine," obtained in New York. (From Messrs. James Bishop & Co.)

Water	13.00
Gluten	9.10
Starch, glucose, dextrine, &c. (by diff.)	77.80
Bran	0.10
	100.00

This flour had sustained some injury, and was unfit for export, or for home use. The gluten formed shreds on the hand, was wanting in elasticity, and dried away, instead of flowing, upon the application of heat.

XI. Wheat from the schooner Montgomery, from Sandusky, Ohio. "Winter wheat, somewhat below the average crop of 1848." (From the U. S. Collector at Buffalo, N. Y.) The grain of this sample was mostly large and plump, mixed with smaller and shriveled ones. It contained 10.65 per cent. of water. The composition of the fine flour obtained from this wheat was the following:—

Water	13.10
Gluten and albumen	11.56
Starch	66.84
Glucose, dextrine, &c.	7.90
Bran	0.60
	100.00

XII. Flour obtained from grinding the residue from the preceding yielded

Water	13.05
Gluten	12.69
Starch, glucose, dextrine, &c. (by diff.)	73.61
Bran	0.65
	100.00

The gluten in both the preceding samples from this wheat was of a good quality—the proportion being larger in the result of the re-grinding.

MICHIGAN.

XIII. Wheat flour labeled "Michigan Superfine," obtained in New York. (From Messrs. James Bishop & Co.)

Water	13.25
Gluten and albumen	11.10
Starch, glucose, dextrine, &c., (by diff.)	74.80
Bran	0.85
	100.00

The gluten of this flour was of good quality; elastic and flowing by heat. I did not follow out the process to the end.

XIV. Fair sample of Michigan wheat of 1848, from cargo shipped on the schooner H. H. Sizer, from St. Josephs, Michigan. (From U. S. Collector at Buffalo, N. Y.) The wheat was ground in a mill, and twice passed through a bolting-cloth sieve. The fine flour was first subjected to analysis, and gave the following, viz:—

Water	12.25
Gluten	10.00
Starch	67.70
Glucose, dextrine, &c.	8.75
Bran	0.75
	99.45

The flour obtained from this wheat was of an inferior quality. It seemed to have lost some of its gluten, and the elasticity of the portion that remained was impaired.

XV. Wheat flour obtained by re-grinding and sifting the residue from the preceding.

Water	12.75
Gluten (similar to the preceding)	11.20
Starch	66.00
Glucose, dextrine, &c.	8.50
Bran	1.05
	99.50

The second grinding, as usual, furnished a larger proportion of gluten, although its quality remained the same as in the preceding.

ILLINOIS.

XVI. Wheat from Littlefort, Illinois; shipped on board the brig Shakspeare, 1848. (From the Collector at Buffalo, N. Y.) This is a spring wheat, containing 11.43 per cent. of water, and yielding a somewhat dark flour, which gave the following results:—

Water	12.73
Gluten and albumen	14.61
Starch	65.20
Glucose, dextrine, &c.	6.45
Bran	0.80
	99.79

This sample was very rich in gluten, which was of a good quality, but became dark-colored by heat.

MISSOURI.

XVII. Superfine flour from Magnolia Mill, St Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	13.18
Gluten and albumen	10.27
Starch	69.75
Glucose, dextrine, &c.	6.15
Bran	0.85
	99.65

The gluten in this sample was of a medium quality. Its elasticity was somewhat diminished.

XVIII. Superfine flour from Mound Mill, St. Louis, Missouri, Hendrickson. (From Mr. T. Gray, St. Louis.)

Water	13.48
Gluten and albumen	10.58
Starch	67.35
Glucose, dextrine, &c.	8.15
Bran	0.20
	99.71

The gluten was of a good quality. The proportion of water, as in most of the Missouri samples, was rather large.

XIX. Superfine flour from Walsh's Mill, St. Louis, Missouri, Messrs. J. & E. Walsh. (From Mr. T. Gray, St. Louis.)

Water	12.70
Gluten	10.63
Starch	69.40
Glucose, dextrine, &c.	6.65
Bran	0.40
	99.78

XX. Superfine flour from Washington Mill, St. Louis, Missouri. Messrs. Ball and Chapin. (From Mr. T. Gray, St. Louis.)

Water	12.88
Gluten and albumen	11.00
Starch (by diff.)	68.65
Glucose, dextrine, &c.	7.27
Bran	0.20
	100.00

Both the preceding samples were of fair quality.

XXI. Extra superfine wheat flour from Missouri Mill. Messrs. Powell, Barlow & Co., St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	13.00
Gluten	10.46
Starch (by difference)	67.79
Glucose, dextrine, &c.	8.35
Bran	0.40
	100.00

Although marked as "extra superfine," this sample was only of medium quality. The gluten had sustained some injury.

XXII. Wheat flour from O'Fallon's Mill, St. Louis, Missouri (Sept. 25th, 1848). Messrs. J. G. Shands & Co. (From Mr. T. Gray, St. Louis.)

Water	12.85
Gluten	11.25
Starch	68.24
Glucose, dextrine, &c.	7.00
Bran	0.66
	100.00

XXIII. Superfine wheat flour, from Phœnix Mill, St. Louis, Missouri. (From Mr. T. Gray, St Louis.)

Water	13.22
Gluten	10.10
Starch	68.70
Glucose, dextrine, &c.	7.30
Bran	0.15
	99.47

In this and the preceding samples, the gluten was of good quality.

XXIV. Superfine wheat flour, Nonantum Mill, St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	12.10
Gluten	11.02
Starch	68.60
Glucose, dextrine, &c.	7.93
Bran	0.35
	100.00

This flour was of an excellent quality and in good condition.

XXV. Superfine wheat flour from Franklin Mill, St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	12.25
Gluten and albumen	10.29
Starch	69.85
Glucose, dextrine, &c.	7.26
Bran	0.35
	100.00

XXVI. Superfine flour, Eagle Mill, St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	11.00
Gluten and albumen	10.15
Starch	69.50
Glucose, dextrine, &c.	8.65
Bran	0.20
	99.50

Although the proportion of gluten was small, this flour was of good quality.

XXVII. Winter wheat from Missouri (1848). (From Mr. T. Gray, St. Louis.) The grain was plump, husk thin; it yielded 12.55 per cent. of water. The flour obtained by grinding in a mill and twice sifting through fine bolting-cloth, gave the following:—

Water	14.00
Gluten and albumen	8.90
Starch (by diff.)	70.05
Glucose, dextrine, &c.	6.20
Bran	0.85
	100.00

This flour is of a medium quality, although the proportion of gluten is small. It could not bear the test of shipment, as is sufficiently shown by the considerable proportion of water which it contains.

WISCONSIN.

XXVIII. Wheat from cargo shipped on the schooner Cleopatra, from Milwaukie, spring and winter wheat mixed, the growth of 1848. (From the U. S. Collector at Buffalo, N. Y.)

The fine flour obtained from this wheat gave the following results:—

Water	12.80
Gluten and albumen	11.30
Starch	68.90
Glucose, dextrine, &c.	6.50
Bran	0.70
	100.20

XXIX. Wheat flour obtained by passing the residue from the preceding a second time through the mill and sieve.

Water	12.80
Gluten	13.46
Starch, glucose, dextrine, &c. (by diff.)	72.54
Bran	1.20
	100.00

In this and the preceding, the gluten was of good quality. The flour obtained from the second grinding, &c., yielded, as will be perceived, a larger proportion of gluten, while the bran was also in larger quantity.

MARYLAND.

XXX. Wheat flour exported from Baltimore to Montevideo, in Uruguay, in 1848. (Sample received from the U. S. Consul, at Montevideo.)

Water	13.00
Gluten and albumen	12.80
Starch	66.15
Glucose, dextrine, &c.	7.10
Bran	0.65
	99.70

The gluten of this sample was only of medium quality. The flour must have been of a superior kind to have passed through so severe a trial with so little injury.

VIRGINIA.

XXXI. Wheat flour from the Richmond city mill: obtained in New York. (From Messrs. James Bishop and Co., crop of 1848.)

Water	11.70
Gluten and albumen	13.00
Starch	67.50
Glucose, dextrine, &c.	6.90
Bran	0.50
	99.60

This flour, though not remarkably white, was of an excellent quality. The gluten was very elastic, flowed by heat, and was of a light color when dry. The reputation of this flour in market, especially for Southern export, seems to be well deserved. It is sometimes, however, objectionable, as are also many of the New Jersey samples, on account of the garlic odor which it gives out.

XXXII. Wheat flour manufactured by Haxall, Bros. and Co., Richmond, Va., obtained in New York. (From Messrs. James Bishop and Co., crop of 1848.)

Water	11.40
Gluten and albumen	12.80
Starch	68.50
Glucose, dextrine, &c.	6.60
Bran	0.35
	99.65

This flour was similar to the preceding. It yielded a fine elastic gluten, which assumed a light color when heated.

XXXIII. Richmond superfine flour of 1848, name of the manufacturer unknown. (From Mr. James A. Scott, Richmond, Va.)

Water	12.05
Gluten and albumen	12.95
Starch, glucose, dextrine, &c. (by diff.)	74.50
Bran	0.50
	100.00

This flour was of an excellent quality. Gluten elastic, and light-colored.

XXXIV. Richmond wheat flour, Haxall's best brand, from the crop of 1849. Manufactured by Messrs. Haxall, Bros. and Co. (From Mr. James A. Scott, Richmond, Va.)

Water	11.40
Gluten and albumen	13.25
Starch	68.20
Glucose, dextrine, &c.	6.25
Bran	0.60
	99.70

This was one of the very best samples of wheat flour that I have as yet analyzed.

XXXV. Richmond flour, second brand: crop of 1849. Columbia wheat

flour, manufactured by Messrs. Haxall, Bros. & Co. (From Mr. James A. Scott, Richmond, Va.)

Water	11.00
Gluten	13.20
Starch, glucose, &c. (by diff.)	75.60
Bran	0.20
	100.00

This flour was excellent so far as the amount and quality of the gluten are concerned. It had a slight garlic odor, which must impair its value.

XXXVI. Family flour, manufactured in 1849, at the Richmond city mill. (From Mr. James A. Scott, Richmond, Va.)

Water	11.90
Gluten	10.50
Starch	70.00
Glucose, dextrine, &c.	7.10
Bran	.50
	100.00

This sample contained less gluten than either of the preceding ones from Virginia, but the quality was good.

XXXVII. "Oregon white wheat," grown by Bernard Peyton, Esq., of Richmond, Va., at Westham Cottage, on James River, 1849. (From Mr. James A. Scott, Richmond, Va.) This sample had the grain hard and plump; it contained 11.95 per cent. of water. A portion of this wheat ground and twice sifted through bolting-cloth yielded the following:—

Water	12.80
Gluten	14.80
Starch, glucose, dextrine, &c. (by diff.)	71.30
Bran	1.10
	100.00

The gluten in this sample was in large proportion and of an excellent quality. One of the finest samples of wheat, and worthy of trial in more northern localities.

XXXVIII. The residue left from the preceding ground and sifted a second time, gave the following results:—

Water	13.85
Gluten	14.50
Starch (by diff.)	65.15
Glucose, dextrine, &c.	5.90
Bran	0.60
	100.00

This sample was accidentally exposed to the air for forty-eight hours, which will account for the larger proportion of water. Reducing the amount of water in it to that in the preceding, the gluten will be nearly the same.

XXXIX. Gallego wheat flour, manufactured by Messrs. Warwick & Barksdale, Gallego Mills, Richmond, Va., ground in August 1849. (From Mr. James A. Scott, Richmond, Va.)

Water	11.50
Gluten	13.50
Starch (by diff.)	68.35
Glucose, dextrine, &c.	6.00
Bran	0.65
	100.00

The results of the above analysis fully account for the high reputation which this flour bears in market.

Results of the Analysis of Various Samples of Wheat and Wheat Flour Shipped from Ports in the United States to Liverpool.

(From Mr. Armstrong, late Consul at Liverpool.)

XL. Wheat flour from ship Brandywine, from New Orleans, 22d November 1848; arrived in Liverpool 30th December, 1848.

Water	13.38
Gluten and albumen	10.62
Starch	67.60
Glucose, dextrine, &c.	7.75
Bran	0.65
	100.00

The gluten was wanting in elasticity, although not seriously injured.

XLI. Wheat flour from ship Fanchon, New York, November 7th, 1848; arrived at Liverpool November 28th, warehoused December 8th, 1848.

Water	13.83
Gluten and albumen	11.38
Starch	67.45
Glucose, dextrine,	6.34
Bran	1.00
	100.00

This flour was rather coarsely ground. The gluten was of a fair quality.

XLII. Wheat flour from ship New World, New York, November 8th, 1848; arrrived at Liverpool November 26th, warehoused December 4th, 1848.

Water	13.65
Gluten and albumen	11.60
Starch	65.80
Glucose, dextrine, &c.	7.70
Bran	0.65
	99.40

This flour had evidently undergone some change. The gluten, although of the medium proportion, wanted the elasticity and other properties which characterize good samples.

XLIII. Wheat flour from ship Juniata, from Baltimore, October 1848; arrived at Liverpool November 9th, warehoused November 14th, 1848.

Water	12.50
Gluten and albumen	14.14
Starch	64.20
Glucose, dextrine, &c.	8.36
Bran	0.80
	100.00

This sample was in a good state of preservation and rich in gluten. Rather coarsely ground.

XLIV. Wheat flour from ship Stephen Lurman, from Baltimore, Nov. 5th, 1848; arrived at Liverpool Dec. 1st, warehoused Dec. 6th, 1848.

Water	11.65
Gluten and albumen	13.18
Starch	64.50
Glucose, dextrine, &c.	9.55
Bran	0.68
	99.56

This sample, like the preceding, was rather coarsely ground. The proportion of gluten was above the ordinary standard.

XLV. Wheat flour from ship Leila, from Baltimore, November 29th, 1848; arrived at Liverpool January 1849.

Water	13.22
Gluten and albumen	13.18
Starch	64.65
Glucose, dextrine, &c.	8.00
Bran	0.95
	100.00

This flour was of good quality, coarsely ground, and not very white.

XLVI. Wheat flour from ship Oxenbridge, from New Orleans, November 13th, 1848; arrived at Liverpool December 31st, 1848.

Water	13.90
Gluten and albumen	10.13
Starch	68.42
Glucose, dextrine, &c.	7.30
Bran	0.25
	100.00

The proportion of water in this sample was somewhat larger than usual, and the gluten had partly lost its elasticity. I did not detect any acidity.

XLVII. Wheat flour from ship Italy, from New York, December 1st, 1848; arrived at Liverpool December 31st, 1848.

Water	12.94
Gluten and bran	10.60
Starch (by difference)	68.56
Glucose, dextrine, &c.	7.90
	100.00

This sample was sour. The gluten was inelastic, breaking into shreds by washing, and with difficulty forming a dough in the hand. By heat, the

mass thus obtained assumed a powdery form, without the horny appearance of good gluten. A second analysis gave me about 9.75 per cent. of gluten, exhibiting the same characters. In samples thus damaged, however, little reliance can be placed upon the accuracy of the separation of the gluten; but this is after all of no great importance.

As it is hardly probable that this flour was shipped from New York in the condition in which it was shown to be by the above analysis, it must have been damaged during its passage.

XLVIII. Wheat flour from ship West Point, from New York, December 13th, 1848; arrived at Liverpool January 1st, 1849.

Water	14.30
Gluten and albumen	12.30
Starch	63.00
Glucose, dextrine, &c.	9.45
Bran	0.95
	100.00

The gluten in this flour was somewhat deficient in elasticity, and did not exhibit the peculiar flowing appearance under the influence of heat, which characterizes good samples. The proportion of glucose, &c., was larger, while that of starch was smaller than usual.

XLIX. Wheat flour from ship Wm. H. Harbeck, from New York, October 19th, 1848; arrived at Liverpool November 21st; warehoused November 29th, 1848.

Water	13.53
Gluten and albumen	10.18
Starch	66.95
Glucose, dextrine, &c.	8.80
Bran	0.30
	99.76

The gluten in this sample was deficient in elasticity.

L. Wheat flour from ship Princeton, from New York, October 27th, 1848; arrived at Liverpool November 23d; warehoused November 25th, 1848.

Water	13.40
Gluten and albumen	11.52
Starch	65.60
Glucose, dextrine, &c.	7.90
Bran	0.85
	99.27

This flour was of fair quality.

LI. Wheat flour from ship Columbus, from New York, December 1st, 1848; arrived at Liverpool December 31st, 1848.

Water	13.50
Gluten and albumen	10.45
Starch	66.45
Glucose, dextrine, &c.	8.50
Bran	1.03
	99.93

This flour was not of very good quality. The gluten was deficient in elasticity, although not spoiled.

LII. Wheat flour from ship Russell Glover, from New Orleans, November 1st, 1848; arrived at Liverpool January 6th, 1849.

Water	13.45
Gluten and albumen	10.47
Starch	66.20
Glucose, dextrine, &c.	8.83
Bran	1.05
	100.00

The gluten of this flour was somewhat inelastic and dark-colored. It seemed to have suffered by shipment.

LIII. Wheat from ship South Carolina, from New Orleans, October 24th, 1848; arrived at Liverpool December 19th, 1848. The grain of this sample was small and rather thin-skinned. It contained 12.75 per cent. of water. The fine flour gave the following results:—

Water	13.80
Gluten and albumen	9.00
Starch	70.80
Glucose, dextrine, &c.	5.95
Bran	0.38
	99.93

The gluten was in small proportion, but appeared to be of good quality.

LIV. The product of the second grinding of the residue from the above, gave,

Water	13.80
Gluten	9.45
Starch, glucose, dextrine, &c. (by diff.)	76.90
Bran	0.85
	100.00

LV. Wheat from ship Cambridge, from New York, October 18th, 1848; arrived at Liverpool November 22d, 1848. This wheat had a large plump grain, with a few smaller and shriveled ones intermixed. It contained 13.80 per cent. of water.

The fine flour obtained from this sample by grinding and twice sifting through fine bolting-cloth, gave the following results:—

Water	14.50
Gluten and albumen	8.52
Starch	70.60
Glucose, dextrine, &c.	5.40
Bran	0.40
	99.42

LVI. The residuum from the above, ground and sifted a second time, gave,

Water	14.10
Gluten and albumen	9.10
Starch	70.55
Glucose, dextrine, &c.	5.45
Bran	0.20
	99.40

Both this and the preceding sample from the same wheat were of a good quality, although the proportion of gluten was below the ordinary standard. The amount of water was large.

LVII. Wheat from ship Columbus from New York, December 1st, 1848; arrived at Liverpool December 31st, 1848. This wheat was much shrunk. It was soft and easily ground. It contained 13.05 per cent. of water. The fine flour from this contained,

Water	14.85
Gluten	8.47
Starch, glucose, dextrine, &c. (by diff.)	76.48
Bran	0.20
	100.00

LVIII. The residuum from the above, ground and twice sifted, gave,

Water	14.15
Gluten	9.00
Starch, glucose, dextrine, &c. (by diff.)	76.60
Bran	0.25
	100.00

This wheat yielded a gluten which was of a good quality, though small in amount.

LIX. Wheat from ship Ashburton, from New York, December 7th, 1848; arrived at Liverpool January 3d, 1849. The grain of this wheat was soft and rather small. It yielded a white flour, and contained fourteen per cent. of water. The fine flour obtained from this wheat, by grinding and passing it twice through a fine bolting-cloth sieve, gave the following results:—

Water	13.55
Gluten	11.68
Starch (by diff.)	69.22
Glucose, dextrine, &c.	5.30
Bran	0.25
	100.00

This flour was of an excellent quality. It is somewhat remarkable that the wheat contained more water than the flour; the latter of which from its nature absorbs a larger quantity of moisture than the former. As the heatings and weighings were carefully performed, the difference may have been caused by the rapid grinding and bolting.

Results of the Analyses of Samples of Wheat and Wheat Flour, the Growth and Manufacture of Foreign Countries.

CANADA WEST.

LX. "Good sample of white wheat," from cargo shipped on steamer London, from Port Stanley, Canada West. (From the U. S. Collector at Buffalo, N. Y.) This wheat had a plump grain, and contained 11.45 per cent. of water. The fine flour, obtained by grinding and twice passing through the sieve, yielded the following results:—

Water	12.80
Gluten	7.23
Starch (by difference)	74.12
Glucose, dextrine, &c	5.10
Bran	0.75
	100.00

LXI. Flour obtained by subjecting the residue from the preceding to grinding and sifting a second time.

Water	12.60
Gluten	8.45
Starch, glucose, dextrine, &c. (by diff.)	78.55
Bran	0.40
	100.00

The gluten of this wheat was not only diminished in quantity, but had lost its elasticity, so as to render the flour unfit for use. The starch was of an excellent quality; its large amount was probably owing to the change of the gluten. I regret that I had no other samples of wheat from Canada to compare with those which are grown in the northern and western parts of the United States. The preceding, being injured during shipment, did not of course afford a fair test. It was interesting, however, as showing the extent to which breadstuffs are in this way deteriorated.

CHILI.

LXII. Chilian wheat flour, from Montevideo, in Uruguay, 1848. (From the U. S. Consul at Montevideo.)

Water	12.44
Gluten and albumen	9.45
Starch	67.80
Glucose, dextrine, &c	8.37
Bran	1.30
	99.36

This flour was of a fair quality, but as the wheat from that country has been highly praised, I was disappointed to find the proportion of gluten so much below the standard in the samples from the United States.

LXIII. Chilian wheat; Montevideo, in Uruguay, 1848. (From the U. S. Consul at Montevideo.) The grain of this wheat was large and plump, and had a thin husk. The fine flour, obtained by grinding and sifting through fine bolting-cloth, gave the following results:—

Water	12.85
Gluten and albumen	8.65
Starch	71.60
Glucose, dextrine, &c	6.10
Bran	0.60
	99.80

LXIV. Wheat from Valparaiso. (Received through Mr. David Bishop, of New Brunswick, N. J.) This was a hard-grained and horny wheat, entirely different from the preceding. It yielded a yellowish flour, like that of maize, and also resembling in appearance the flour from the Kubanka wheat. It contained 9.40 per cent. of water. The wheat was twice ground and passed through the sieve. The flour was still gritty, and, on attempting to wash the dough, it separated into strings and fibres. It must have undergone some change, but I was unable to determine the precise nature of it. The flour, as above, was found to contain

Water	12.50
Gluten, with some bran, having no elasticity and becoming pulverulent by heat	14.55

FRANCE.

LXV. French wheat flour imported into England in November, 1848. (From Mr. Armstrong, late U. S. Consul at Liverpool.)

Water	13.20
Gluten and albumen	9.85
Starch	69.00
Glucose, dextrine, &c. (by diff.)	7.65
Bran	0.30
	100.00

This flour was of a fair quality; but it was less rich in gluten than the average of our U. S. samples.

For the sake of comparison, I here introduce the analyses of various samples of French wheat and wheat flour by Vauquelin and Peligot.

Kind of flour or wheat.	Water.	Gluten and Albumen.	Starch.	Other. ingredients.	Total.
Common wheat flour	10.00	10.96	71.49	8.04	100.49 V.
Wheat flour from the bakers of Paris	10.00	10.20	72.80	7.00	100.00 V.
Flour, second quality	8.00	10.30	71.20	8.40	97.90 V.
Wheat grown near Paris	15.20	10.70	63.60	10.50	100.00 P.
Wheat from the Lower Loire	13.90	10.60	66.70	8.80	100.00 P.
Soft wheat of Provence	14.60	9.90	66.10	9.40	100.00 P.

SPAIN.

LXVI. Wheat flour from Santander, made from Spanish wheat. "The sample taken from the original package, as it arrived in May, 1848." (From George Read, Esq., U. S. Consul at Malaga.)

Water	13.50
Gluten and albumen	10.30
Starch	68.90
Glucose, dextrine, &c	7.00
Bran	0.30
	100.00

This flour was of a good quality.

LXVII. Wheat flour from *Cañivano*, or *soft wheat*, grown five or six leagues N. W. of Malaga. (From George Read, Esq., U. S. Consul at Malaga.) This flour has a yellowish color, like maize meal; it contains,

Water	11.33
Gluten	16.85
Starch	63.10
Glucose, dextrine, &c	6.50
Bran	2.30
	99.58

This sample was remarkable for the large proportion of gluten (analysis twice repeated) which it contains. The gluten was excellent, and in amount only equaled by the flour from the Kubanka wheat.

LXVIII. Soft or *Cañivano* wheat, grown five or six leagues N. W. of Malaga. (From George Read, Esq., U. S. Consul at Malaga.)

This wheat was ground in a mill and passed through fine bolting-cloth. The fine flour gave the following:—

Water	11.15
Gluten	15.40
Starch	67.25
Glucose, dextrine, &c	5.70
Bran	0.60
	100.10

LXIX. A coarser sample of flour, obtained by grinding the residue from the preceding, gave,

Water	12.60
Gluten	18.70
Starch, glucose, dextrine, &c. (by diff.)	67.00
Bran	1.70
	100.00

The gluten from this sample was in large proportion and of a good quality. The whole meal as usual gave better results than the fine flour.

LXX. Wheat flour from the grain called *Trigo Recio*, hard wheat grown on the grounds about thirty miles north of Malaga. (From George Read, Esq., U. S. Consul at Malaga.)

Water	10.87
Gluten, &c	12.15
Starch	64.38
Glucose, &c. (lactic acid?)	12.60
	100.00

This sample it is to be regretted was musty and otherwise injured. It was of a yellowish color and coarsely ground. The gluten had entirely lost its elasticity. This flour is represented as being of a fine quality, when uninjured.

LXXI. Wheat grown on the high grounds about thirty miles north of Malaga, of the kind called *Trigo Recio, hard* wheat, or *Trigo Claro.* (From George Read, Esq., U. S. Consul at Malaga.) This wheat has a large hard grain, and gives a flour like that above described. This sample like the preceding, was damaged. It contained 7.45 per cent. of water. I could only succeed in making an imperfect analysis, as the gluten had entirely lost its elasticity. The results are as follows:—

Water	10.00
Gluten, &c	14.50
Starch	60.20
Glucose, dextrine, &c. (lactic acid?)	15.30
	100.00

Table Exhibiting the Composition of Various Samples of American and Foreign Wheat Flour, by Lewis C. Beck, M. D. (1849).

Kind of Wheat Flour.	Water.	Gluten and albumen.	Starch.	Glucose, dextrine, &c.	Bran.	Total.
I. From Country Mills, New Jersey	12.75	12.55	65.95	8.10	0.65	100.00
II. From West Jersey Wheat	12.80	11.32	69.48	5.90	0.50	100.00
III. From White Wheat, New Jersey	11.55	12.60	66.85	8.50	0.50	100.00
IV. From Pennsylvania Wheat	11.90	13.16	66.20	7.25	0.75	99.26
V. From do do	13.35	12.73	66.90	6.50	0.52	100.00
VI. From do do (2d grinding)	13.35	14.72	71.28		0.65	100.00
VII. From Pelham Wheat, Ulster Co., N. Y.	10.79	13.17	67.74	7.60	0.70	100.00
VIII. From "Pure Genesee" Wheat	13.20	11.05	75.20		0.55	100.00
IX. From Ohio Wheat, "fine"	12.85	12.25	73.90		1.00	100.00
X. From Ohio Wheat, "Superfine"	13.00	9.10	77.80		0.10	100.00
XI. From Winter Wheat, Ohio	13.10	11.56	66.84	7.90	0.60	100.00
XII. From do do (2d grinding)	13.05	12.69	73.61		0.65	100.00
XIII. From Michigan Wheat, "Superfine"	13.25	11.10	74.80		0.85	100.00
XIV. From Michigan Wheat	12.25	10.00	67.70	8.75	0.75	99.45
XV. From do do (2d grinding)	12.75	11.20	66.00	8.50	1.05	99.50
XVI. From Illinois Wheat	12.73	14.61	65.20	6.45	0.80	99.79
XVII. From Magnolia Mill, St. Louis, Mo.	13.13	10.27	69.75	6.15	0.35	99.65
XVIII. From Mound Mill, St. Louis	13.48	10.53	67.35	8.15	0.20	99.71
XIX. From Walsh's Mill, St. Louis	12.70	10.63	69.40	6.65	0.40	99.78
XX. From Washington Mill, St. Louis	12.88	11.00	68.65	7.27	0.20	100.00
XXI. From Missouri Mill, St. Louis	13.00	10.46	67.79	8.35	0.40	100.00
XXII. From O'Fallon's Mill, St. Louis	12.85	11.25	68.24	7.00	0.66	100.00
XXIII. From Phœnix Mill, St. Louis	13.22	10.10	68.70	7.30	0.15	99.47
XXIV. From Nonantum Mill, St. Louis	12.10	11.02	68.60	7.93	0.35	100.00
XXV. From Franklin Mill, St. Louis	12.25	10.29	69.85	7.26	0.35	100.00
XXVI. From Eagle Mill, St. Louis	11.00	10.15	69.50	8.65	0.20	99.50
XXVII. From Winter Wheat, Missouri	14.00	9.30	70.05	6.30	0.35	100.00
XXVIII. From Wisconsin Wheat	12.80	13.20	68.90	6.50	0.70	100.00
XXIX. From do do (2d grinding)	12.80	13.46	72.54		1.20	100.00
XXX. From Maryland Wheat	13.00	12.30	66.65	7.10	0.85	99.70
XXXI. From Richmond City Mill	11.70	13.00	67.50	6.90	0.50	99.60
XXXII. From Haxall & Co., Richmond, Va.	11.40	12.80	68.50	6.60	0.35	99.65

Kind of Wheat.	Water.	Gluten and albumen.	Starch.	Glucose, dextrine, &c.	Bran.	Total.
XXXIII. From Virginia Wheat, "Superfine"	12.05	12.95	74.50		0.50	100.00
XXXIV. From Haxall & Co. "Best brand '49"	11.40	13.25	68.20	6.25	0.60	99.70
XXXV. From Haxall & Co. "2d brand '49"	11.00	13.20	75.60		0.20	100.00
XXXVI. From Richmond City Mill, '49	11.90	10.50	70.00	7.10	0.50	100.00
XXXVII. From Oregon White Wheat, Va.	12.80	14.80	71.30		1.10	100.00
XXXVIII. From do do (2d grinding)	13.85	14.50	65.15	5.90	0.60	100.00
XXXIX. From Gallego Mill, Richmond, Va	11.50	13.50	68.36	6.00	0.65	100.00
XL. From Ship Brandywine, Liverpool	13.38	10.62	67.60	7.75	0.65	100.00
XLI. From Ship Fanchon, Liverpool	13.83	11.38	67.45	6.34	1.00	100.00
XLII. From Ship New World, Liverpool	13.65	11.60	65.80	7.70	0.65	99.40
XLIII. From Ship Juniata, Liverpool	12.50	14.14	64.20	8.36	0.80	100.00
XLIV. From Ship Stephen Lurman, Liverpool	11.65	13.18	64.50	9.55	0.68	99.56
XLV. From Ship Leila, Liverpool	13.22	13.18	64.65	8.00	0.95	100.00
XLVI. From Ship Oxenbridge, Liverpool	13.90	10.13	68.42	7.30	0.25	100.00
XLVII. From Ship Italy, Liverpool	12.94	& bran 10.60	68.56	7.90		100.00
XLVIII. From Ship West Point, Liverpool	14.30	12.30	63.00	9.45	0.95	100.00
XLIX. From Ship W. H. Harbeck, Liverpool	13.53	10.18	66.95	8.80	0.30	99.76
L. From Ship Princeton, Liverpool	13.40	11.52	65.60	7.90	0.85	99.27
LI. From Ship Columbus, Liverpool	13.50	10.45	66.45	8.50	1.03	99.93
LII. From Ship Russell Glover, Liverpool	13.45	10.47	66.20	8.83	1.05	100.00
LIII. From Wheat, Ship South Carolina, Liverpool	13.80	9.00	70.80	5.95	.38	99.93
LIV. From do do do (2d grinding)	13.30	9.45	76.90		.35	100.00
LV. From Wheat, Ship Cambridge, Liverpool	14.50	8.52	70.60	5.40	.40	99.42
LVI. From do do do (2d grinding)	14.10	9.10	70.55	5.45	.20	99.40
LVII. From Wheat, Ship Columbus, Liverpool	14.85	8.47	76.48		.20	100.00
LVIII. From do do do (2d grinding)	14.15	9.00	76.60		.25	100.00
LIX. From Wheat, Ship Ashburton, Liverpool	13.55	11.68	69.22	5.30	.25	100.00
LX. From Wheat grown in Canada West	12.80	7.23	74.12	5.10	.75	100.00
LXI. From do do do (2d grinding)	12.60	8.45	78.55		.40	100.00
LXII. From Chilian Wheat	12.44	9.45	67.80	8.37	1.30	99.36
LXIII. From Chilian Wheat	12.85	8.65	71.60	6.10	.60	99.80
LXIV. From Valparaiso Wheat	12.50	& bran 14.55				
LXV. From French Wheat	13.20	9.85	69.00	7.65	.30	100.00
LXVI. From Spanish Wheat	13.50	10.30	68.90	7.00	.30	100.00
LXVII. From *Canivano* Wheat	11.33	16.35	63.10	6.50	2.30	99.58
LXVIII. From *Canivano* Wheat	11.15	15.40	67.25	5.70	.60	100.10
LXIX. From do do (2d grinding)	12.60	18.70	67.00		1.70	100.00
LXX. From *hard* wheat grown near Malaga	10.87	12.15	64.38	12.60		100.00
LXXI. From do do (2d grinding)	10.00	14.50	60.20	& lactic acid. 15.30		100.00

niently assist in their accomplishment, I beg leave to tender in advance, for any contributions you may be pleased to make, my respectful acknowledgments.

I remain, yours, respectfully, &c.,

THOMAS EWBANK, *Commissioner*.

V.

REPORTS AND LETTERS RELATING TO CROPS, &c.

CIRCULAR.

UNITED STATES PATENT OFFICE, WASHINGTON, *July*, 1849.

SIR:—A desire faithfully to discharge the duties devolved on this office in relation to Agriculture, prompts me to seek impartially from persons of known experience and research the best information on the several topics embraced in this circular, and upon such others as may, in the judgment of practical men, contribute to the benefit of that vitally important branch of our national industry.

Comprehending, as this circular necessarily does, a variety of subjects, with all of which no one person can be supposed to be practically familiar, it is presumed that each one to whom it may be addressed will confine his observations to such matters as have come under his own experience. Such information, it is the purpose of Congress in this mode to collect and distribute for the common benefit of the agricultural community, and it cannot but be, in the aggregate, of enduring value.

Excluding mere estimates and local details of weather and crops, which may be found in the able agricultural journals of the country, the design of the annual report, to which you are invited to contribute, is to bring to light and register in a permanent form important facts and discoveries, the results of actual experiment, which might not otherwise become so soon nor so widely known.

It is likewise intended to constitute a repository of agricultural statistics, founded upon official and other reliable data, which may serve as authentic bases for the use of the politico-economical inquirer and legislator.

Whatever may have been tested and found new and useful in practice, together with important agricultural statistics, will be acceptable; especially suggestions as to the introduction of such new objects in the way of machinery, animals, processes, or plants, as may tend to the profitable diversifying of the application of labor and capital to the all-important science of cultivation.

With this brief explanation of the objects contemplated by Congress, and leaving to your discrimination to judge how you may best and most conve-

niently assist in their accomplishment, I beg leave to tender in advance, for any contributions you may be pleased to make, my respectful acknowledgments

I remain, yours, respectfully, &c.,

THOMAS EWBANK, *Commissioner.*

The Commissioner of Patents, in execution of acts of Congress, desires to procure information from Planters, Farmers, and others, on the following and any other points that may occur to you connected with Agriculture.

Wheat.—Your experience as to varieties—difference in weight, and of time in ripening—their enemies and diseases—soil and manures best adapted to.

Oats.—What varieties have you tried, and with what results, particularly as to time of ripening—what their estimated value as compared with corn as food—is the cultivation of the oat becoming more or less popular, and for what reason?

Rye.—Have you knowledge of any new and valuable variety—to what uses is it applied—have crops diminished of late years, without any apparently corresponding diminution in the fertility of the soil, and to what influence is it supposed to be attributable?

Barley.—Have any new varieties been tried, and with what results—to what uses is this grain applied in your State—if not cultivated, is it forbidden by your soil and climate?

Maize (Indian Corn).—What varieties most esteemed, and for what reasons—what the difference in time of ripening—is it liable to change of character and qualities according to soil and climate, and other influences, and your observations on that point—give the estimated value of the shuck as compared with the blade, and of both as compared with good hay, weight for weight—what is the value of green corn for soiling cattle, and especially for producing milk—your experience as to feeding grain, whole or ground, cooked or raw.

Rice.—Variety cultivated—describe any new and valuable process for its cultivation or preparation for market.

(*Note.*)—As to all these grains, please state the cost of production and usual weight, and the probable *average* per *acre*, and actual *aggregate product*, if known, of each in your State—whether the average product per acre has increased or diminished—whether the weight per bushel of the various grains is fixed by law in your State, and what weight is prescribed for each.

Hay.—State the comparative value as food for stock, of clover, timothy, and mixed hay—the grass seeds preferred in laying down meadows—the

average yield per acre: describe any new process in curing—have meadows been irrigated in your State, and with what effect?

Peas.—For what purposes cultivated in your State—for food, or for improving the soil—estimated value as food for stock compared with Indian corn—the most esteemed variety for field culture—average product per acre—value of haulm or vines compared with other fodder—average price per bushel in the last year.

Root Crops.—Irish and sweet potato, turnips, carrots, beets, mangold wurtzel, artichoke, and other varieties—comparative value—cost of production—weight per bushel—and the average per acre, and aggregate product for your State.

Cotton.—Average yield per acre and per hand in your State—aggregate yield of the whole State for 1849—describe new varieties and processes of cultivation—manures best adapted to—cost, per pound or bale, of production—freight charges, commissions, &c., paid by the planter.

Sugar.—Whether of cane or maple—the product per acre—describe any new process of cultivation or manufacture—variety of cane cultivated—its enemies and diseases—cost of making sugar—freight, charges, commissions, &c., paid by the planter.

Hemp.—On this head give any information that you may deem valuable and new, as to varieties, processes of cultivation, and preparation for market—soil and manures best adapted to—cost of production.

Dairy Husbandry.

Butter.—Quantity made in your State—average annual produce per cow—are cellars or spring-houses preferred?

Cheese.—Same questions.

Cattle.

Horses and Mules.—Number raised in your State—average value of each—comparative value for farming purposes—where is your market for them?

Number of *Horned Cattle* in your State—average value of, at three years old—where driven to market—cost of keep per head per year—which of the improved races is preferred?

Sheep Husbandry.—What the prevailing races—what the condition of this branch of industry—amount of wool clipped in the year, and average weight of fleece of different races—cost of keeping sheep through the year per head—where your markets—what your system of selling—have you wool depots, and are they found advantageous for wool-grower and manufacturer—what number killed by dogs in your State?

Hogs.—Average weight at a given age—average weight consumed per head—proportion of live to net weight, and cost of production per pound.

Rain.—Time and degree of highest and lowest range of thermometer, and the mean temperature of the year; also inches of rain water in each month, and aggregate for the year.

Labor.—Cost of, with and without boarding, and cost of boarding.

Tar and Turpentine.—Quantity and value of, produced per hand.

Plaster and other Fertilizers.

Lime.—If used as an improver in your State, how much is thought to be best per acre, and how often applied?

Orchards, fruits, transplanting of trees, &c. Information on these and kindred matters, will be of universal interest.

On the cultivation of the Vine—on Grapes, and American Wines, communications are particularly solicited.

P. S.—Please answer as soon as convenient after you procure the information, and, in the mean time, please name any one to whom this circular may be sent in the hope of fuller information. If not room on the circular, please reply on a separate paper, referring distinctly to the queries.

SPRINGFIELD, VT., *Jan'y* 23d, 1850.

SIR:—Having recently received from the P. M. at Rochester in this State, C. Morgan, Esq., your circular of July, 1849, with a request to reply to those inquiries with which I may be conversant by experience and observation, I take pleasure in complying, and will briefly state a few facts, and give my views upon the various topics, so far as they embrace the industrial pursuits of this section of our vast country.

The culture of *wheat* in this part of the State (Windsor county) is but limited, and I think rather diminishing throughout the State, as facilities increase for the transportation of western flour to our borders, though on newly cleared, and on elevated lands of a deep strong soil, fifteen to twenty-five bushels per acre are frequently obtained; but it is by no means a certain crop.

Rye has considerably diminished within the last twenty years, as it is not now considered so important an article for family consumption since western flour has become cheaper and a common article of consumption and necessity in most families; and the praiseworthy and philanthropic spirit of the age having banished the *spirits* formerly extracted from this grain, it is no longer cultivated as a source of profit, and the pernicious and destroying worm of the distillery has ceased to fold its coils among us.

Barley has never become of much note in this section. I am of the opinion that neither our soil nor climate is well adapted to its culture. Oats are a hardy and sure crop, unless affected by a severe and long-continued drouth, as in the early part of the last season, which diminished the production full one-fourth on an average. They are much used, and considered the best grain for horses, find a ready sale, and are profitable, though quite an exhauster to the soil—averaging about forty-five bushels per acre.

Maize or Indian Corn is a great crop with us here in the Connecticut River valley, and the same I believe is true of western Vermont, the valley of the Otter Creek, and along the Lake shore; but on the high dividing ridge, and in the northern counties bordering upon Canada, the climate is too severe for its profitable cultivation. The kind mostly cultivated is the yellow eight-rowed, though some prefer the twelve and sixteen-rowed, known here by the name of the *Dutton* corn; but my experience in cultivating the different kinds for the last twenty-four years has forced me to the conclusion that the common eight-rowed, mixed with a kind called the *Brown* corn, does the best; the kernel of the latter bearing upon a chocolate hue, and the mixture of these two kinds of seed imparting a deep rich color to the whole, when they become blended, and enhancing the yield whenever the soil is in high tilth. Of this kind, the writer has raised the past season upon eleven acres on the Connecticut River alluvion, over eight hundred bushels shelled corn, four acres of which, with extra preparation, produced four hundred and sixteen bushels.

It will never do to carry seed corn from South to North, as it will not mature in a higher or colder climate than that from which it has been taken. Even half a degree of latitude sensibly affects the maturing of the blade, and renders it an uncertain crop, in our high northern latitudes. To insure an extra yield of this valuable grain, the soil must be highly manured, deeply ploughed, thoroughly cultivated and hoed, and top-dressed with lime, house ashes, and plaster. This done, it is the most remunerative and profitable of all our grain crops.

The shuck or fodder will pay the harvesting of the crop, and is worth on each acre more than a ton of good hay for milch cows or young cattle. Although large crops of this grain are annually obtained by some of our best farmers, and might be by all with proper management, yet the average per acre for Vermont does not probably exceed forty bushels; and at this rate it is profitable, so valuable and important has it become as food for both man and beast. The average product per acre of all kinds of grain cultivated here is rather on the increase; farmers are awakening to their true interests, and as railroads progress, opening new avenues to the fertile regions of the west, we find that we must compete in our eastern markets with our western brethren, laden with the products of their cheap and virgin soil; and the necessity imposes itself upon us to make the most of our resources, which are ample and at our command, if we will but improve them. Vermont will, in the coming census, in my opinion, retain the position in which the statistics of the last census placed her, at the head of the Union in agricultural products, in proportion to area and population.

In feeding grain to cattle it should always be ground, and to hogs not only ground but cooked; to horses and sheep it is not so essential; they masticate it more, and it is seldom we see any undigested food pass from them. The standard of grain weights for Vermont, are: wheat, sixty pounds per bushel, rye and corn, fifty-six pounds; oats, thirty-two pounds; and the average weights of these grains will overrun the legal standard, thus showing our soil and climate adapted to their growth and perfection, with the exception, however, of wheat, in the production of which we must yield the palm to the West. The cost of labor for grain crops varies in proportion to quantity obtained, and no very accurate estimate can be given. It costs nearly the same labor to get a *small* crop that it does a *great* one, and the cost per bushel is diminished in proportion to the increase in the number of bushels. My own experience teaches me that Indian corn and rye can be produced, including interest on land, fencing, taxes, and all other charges, at forty-five cents per bushel, oats at twenty-five cents, but the uncertainty of the wheat crop will render the average cost on our old lands, I think, as high as one dollar per bushel.

The *hay crop* is very important and essential in this high northern latitude.

A mixture of clover, timothy, and red-top, is considered the most valuable; one ton and a half per acre an average, though on our best lands we get two to three tons per acre, and a second crop in September, if we choose. *Roots*, except the potato, are not much cultivated, and the malady has greatly diminished their culture, though the last season has been more favorable than the preceding ones, and a fair crop in *quality* was realized, though not in *quantity*. Dairying and the raising of cattle and horses are on the increase in Vermont, and they find a ready market at Boston and its vicinity, where they stand high for their excellence. The Vermont horses of the *Morgan* breed are not surpassed in the known world. Of the improved breeds of cattle, the Devons are preferred, as being hardy, close and compact, good feeders, beautiful in form and color, and well adapted to the dairy, to the yoke, to the stalls, and to the rigidness of our climate.

Sheep Husbandry, I regret to say, is diminishing in consequence of the low prices of wool under our present tariff, which fosters a foreign competition in all woollen fabrics, and in the production of wool. This once great source of wealth to Vermont, I fear, is destined to be annihilated, and we are again to become dependent upon *foreign workshops* for our clothing, one of the essential necessaries of life. Vermont once numbered nearly one and a half millions of sheep, which have dwindled down, probably to about half a million, averaging about three pounds wool per head, ranging in quality from half to full-blood merino. Cost of keeping per annum, one dollar fifty per head. We find a ready sale for our wool at whatever the article is worth, to the manufacturers in this and the adjoining States. Cost of making pork here is six cents per pound, and but very little done above domestic wants. Cost of farm-labor seventy-five cents per day, or fifteen dollars per month, with board, which is worth one dollar fifty to two dollars per week, though in some parts of the State both labor and board may be lower.

Plaster, Lime and Ashes are considerably used as fertilizers, and with success. Orcharding of grafted winter fruit is receiving much attention; trees are transplanted both fall and spring; the latter, however, is considered the more favorable time. I would remark that the apple crop proved a total failure here last season.

Yours, with due respect,

J. W. COLBURN.

HON. THOS. EWBANK,
Commissioner of Patents.

RICHMOND, MASS., *December* 1849.

SIR:—In giving agricultural statistics there is almost uniformly a great error committed in not noticing the soil, climate and local position of the territory whose products are enumerated. For example, one individual speaks of a remarkable crop in his neighborhood, and his statement to those of other and less congenial localities looks extravagant, and it may be they consider the whole statement a fabrication. In another instance, a farmer may raise what appears to him, and in reality is a fine and profitable crop for his section: one for which he is perhaps entitled to much credit for skill, and yet in another region this may be looked upon as a very slim product; perhaps hardly worth the labor of ingathering. So it will be seen, that in order to make a fair estimate in these matters, *causes* concurring to produce effects should be discovered in order to have these effects appreciated at their true value.

With this view of the matter, I have thought proper in speaking of the agricultural products of western Massachusetts, of the current year, to advert briefly to our geographical position, the nature of our soil, &c., hoping that if my effort does not interest *all* your readers, it will some, who will in their turn give us like particulars, more interesting if they please, of their own surroundings.

First then, our geographical position. The south line of the State is on 42° 2′ 59″ 54‴, the north-west corner is on 42° 44′ 45″ 58, by the trigonometrical survey of the State, published in 1846. The western line of the State runs on a range of mountains running in a south-west and north-westerly direction. This range is composed principally of talco-micaceous slate, though not in so great quantities as in any way to hinder its cultivation. The slope of the mountain towards the east is gradual, and many fine farms, both for grazing and grain, are spread over its eastern declivity. The height of the range is various, some of its highest points being three thousand feet above the level of the ocean.

On the east, a continuation of the Green Mountain range divides the valley of Berkshire from that of Connecticut River. This mountain on the north rises more than two thousand feet. Passing southerly, the elevation is less, and the surface better adapted to cultivation, though its principal value is for grazing. The prevailing rock of the mountain, in the northern part of the State and on the eastern declivity, is mica slate, while its western and southern material is composed to a very great extent of quartz rock, intermingled occasionally with chlorite, steatite and gneiss, the two former in moderate quantities. Between these two mountains, the Green and Taconic, opens the beautiful valley of Berkshire, extending north-east and south-west through the whole length of our territory. Along the centre of the valley rise several mountains, some of them abruptly, to high and giddy elevations. On the north, and foremost in rank, old Greylock, the highest land in the State, lifts its storm-defying head, and looks down upon all the lesser hills around as his younger brethren. It is a feature in all our central mountains and hills that they are high and abrupt at their northern points and slope off gradually towards the south. These central mountains are uniformly composed of mica slate, except Monument Mountain, in Stockbridge, where basaltic rock prevails.

Such are our mountains, the birth-places of a thousand little rivulets, that come jumping and skipping down their sides, giving melody to the music of birds, and bearing in their course the disintegrated portions of the rocks and deposits of the forest, to fertilize and enrich the teeming lands below. The prevailing rock of the valley is primitial limestone, running into every variety, from mouldering dolomite to the most enduring marble. Here, too, iron ore is found spreading itself in veins through the length, and from the discoveries that have been made, the breadth of the valley. Such are the prevailing geological features of our country, and it is to the decomposition and intermingling of the substances of these minerals with the primitive earths, aided by the vegetable matter accumulated by time, that our soil is indebted for its natural fertility.

The soil of Western Massachusetts is of a happily varied character. Clayey loam probably predominates. This is frequently two and three feet deep,

and is usually based on a clay subsoil. Sometimes it is not more than twelve or fifteen inches to this impermeable bottom, and sometimes, where the skinning system has been pursued, it rises to the surface and warns its owner to "seek another and a better country," or apply his mental and physical energies to resuscitate the one he possesses. Then we have our gravel loams, our sandy loams; our pure gravel and pure sand plains. In fact, our soil runs into rich variety, and almost every hundred acres has a share in some two, three, or more of them. Thus much for the general character of our soil; and here we may as well, as anywhere, speak of the means employed for its improvement. Barn and stable manure of course is, and has been from the beginning applied to this object. But the supply of this is inadequate to the demand, and farmers are making the most of it in many cases, that economy will permit. Barn cellars are found favorable to this object, where it is sheltered from the storms and wasteful winds. The quantity is much increased by drawing muck from the pond-holes, which are abundant, and saving and incorporating all decomposable substances. These composts are valuable as top-dressings to grass, and on many soils for ploughed crops.

Ashes are sought for eagerly, and given to the land with great profit. Lime is used some, but the price which the market warrants forbids its general application, though its good effects, in due time, are unmistakable. Plaster of Paris (gypsum) is valuable on all lands dry enough to plough, and is probably used in the county to the amount of three hundred tons in a year, at a cost of seven or eight dollars a ton at the mill.

Ploughing in green crops is a practice gaining ground from its observable good effects.

But there is another renovating process going forward, which is probably superior to all others; at any rate, without it, all others will in the end fail. *Deeper ploughing*, bringing up soil to the influence of the sun and air, which has long been excluded from them, is gaining ground, and better harvests tell the story of its virtue.

The climate of Berkshire is one of stern realities. More than forty-two degrees north, and in the hilly country of this high latitude, our lowest point more than six hundred feet above the ocean, it may well be supposed we often hear the rattling of hail and feel the pinching influence of early and late frosts. A few of our late seasons have, to be sure, been less rigid in their character, but we have known more than one winter set in in earnest early in November, and eight long months of foddering ensue. More recently, however, sheep and neat cattle need but little care until the middle or last of that month, and sheep are turned off in April, sometimes the first, and from that to the twentieth. The present season, with the exception of cows and animals employed for labor, stock does very well out to December.

And now with regard to your circular; and here permit me to say, that although the spring came on favorably early, and from its moisture promised favorably to the grass and grain crops, our farmers were doomed to disappointment in some of these by the pinching drouth of June and July, which were actually dryer than any two corresponding months we have ever known. For the quantity of rain in these and subsequent months, we refer you to our notes in the Smithsonian Institute, transmitted monthly.

Wheat.—The variety mostly cultivated is the Spring Black Sea. It is among the most hardy varieties, but little subject to rust, not proof against

insects, but troubled less by the midge than most kinds. Its common weight is sixty, and if first rate, sixty-two and sometimes sixty-four pounds per bushel (sixty pounds is lawful weight). The quality of the flour depends much upon the character of the land on which it is raised; on a slaty or sandy soil, it is white and good. Soil appears to affect this more than any variety of grain we know of; rust, midge (sometimes called weevil) and improper culture are the worst enemies to the wheat crop.

The former may be often guarded against by selecting porous soils. We have found sowing plaster on the crop when the wheat was in blossom, a check upon the midge. Any dry porous soil will produce wheat, if other qualities are equal. Our best farmers prefer applying their manure to a previous crop and putting the land in clean condition. Hot fermenting manures should be avoided the season of sowing, unless the land is cold and inclined to moisture. On many lands we have successfully applied barnyard litter, containing but little manure, as a top-dressing.

Oats.—The quantity sown, about the same as last year, but the crop diminished one-fourth at least by drouth. Their value compared with corn, if the market prices are reliable tests, is as four to seven, legal weight thirty pounds per bushel.

Rye.—Mostly used as a breadstuff and for feeding, though we have one or two whisky distilleries that consume more than their proportion. More was sown this than many previous seasons, which all looks well. The last crop was good; cause, improvement in the soil and proper care in getting in the crop.

Barley.—No important change from last year; a good crop; adapted to our soil and climate; used for feeding.

Indian Corn.—The varieties raised are very numerous. It changes its character by change of climate and even soil—will bear bringing in from the north much better than the south. Time of coming to maturity depends on soil and time of planting, but principally on soil and culture—crop suffered from drouth this year—ears not as long nor as well filled as usual—legal weight 60 lbs. per bushel.*

Root Crops.—The potato crop has been the best for many years—there has been but very little of the scourging rot, and potatoes are of good size and fine quality. We hope the evil of past years has passed away to afflict us no more. We have seen the yield per acre reach in some cases four hundred and six hundred bushels. If they have averaged two hundred bushels per acre, we will be agreeably disappointed. The price has varied from twenty-five to forty-four cents per bushel. Other root crops raised in small quantities—their value not appreciated.

Hay.—A mixture of herds-grass and red top, we think, makes the best hay for all kinds of stock. Grass was lighter the present year in consequence of the drouth. We occasionally see a meadow irrigated sometimes with good and sometimes with bad success. When very cold water is turned on and allowed to remain, its effects will in time be fatal.

Butter.—An increase in quantity, probably of fifteen per cent., average price sixteen and three-fourths cents, lowest price fourteen cents—market in the county.

Horses.—None raised for foreign market. Price varying according to

* Cost of raising various grains given in my communication of last year.

quality. Ordinary worth from forty to seventy-five dollars, and price increasing according to value.

Cattle.—Taking the additional number of calves raised into account, there is probably an increase of one-third from last year. Beef principally consumed in the county. Devons and Ayrshires are best suited to this region.

Sheep.—The low price of wool in former years has somewhat reduced the number, though farmers are more eager to keep them than they were a year ago. The Merino and Saxon races still prevail, though the Southdown and Tees-water are found more numerous than formerly. The average weight of fleeces varies in different flocks of the same race. Saxons two and a half to three pounds. Merinos three to three and a half pounds. It is worth one dollar and fifty cents to keep a sheep a year, and costs many, taking interest on value of land, more than that. Market in the county. Have a wool-depot which has its favorites and its opponents. We have sought the opinions of several intelligent farmers as to the number of sheep killed by dogs in a year, and have heard no one put it down at more than one in four hundred; we will, however, to gratify dog-hatred, say one in three hundred, which is a number far less than those stolen and killed by worthless vagabonds of the human species. Probably not more than one dog in seventy-five is guilty of this outrageous practice, and not more than one man in a hundred but is ready to kill his dog when found guilty of so base a misdemeanor. The prices of wool have advanced from last year. At clipping time, it sold at from thirty to forty cents per pound, and has advanced since some ten or fifteen per cent.; the quantity in the hands of growers is small.

Hogs.—The average weight at eighteen months old is probably three hundred pounds, though many spring pigs are made to approach that weight. No man in this region can produce good pork for less than six cents per pound.

Labor.—Men get from ten to sixteen dollars per month and boarded, for six months commencing in April.

Orchards.—We have two sorts of cultivators, one of which must have things *done*, whether any good result follows or not. This class set their fruit-trees in little cramped pits, tumble earth, stone and turf promiscuously upon the roots, and then if the trees do not live and bear fruit the second year, they conclude it is of no use for them to attempt to raise fruit, as their soil, the climate, or some other sad obstacle prevents them. It is no wonder their trees die; many are annually lost by this practice. Then we have another class who do things with care. They dig pits perhaps six feet in diameter and two feet deep, and have a supply of compost at hand to mix with the earth, when it is replaced. Their trees are taken up and set out with care, and the nice fine rich earth placed around them; it is no wonder they grow. Then, again, this class of cultivators obey the Scripture injunction to dig about and dung their trees when necessary, and see themselves compensated for all their trouble. These men seldom lose a tree, seldom have a sickly one. An excellent practice also prevails of washing the trunks of fruit-trees with a strong lye. It destroys insects, and gives a fresh healthful appearance to the bark. The valley of Berkshire is well calculated for raising the finest apples and pears. Plums do well here, and peaches and cherries can be raised with care, unless the seasons are *very* unfavorable. There have been good crops of peaches the past season. Much attention is paid to putting out fruit-trees, and this region will eventually become famous for fine fruits.

Stimulants to exertion.—Berkshire county has two agricultural societies: "Berkshire County Society," founded in 1811, and "Housatonic Society," founded in 1842. Each society has about three hundred members, and funds to the amount of three thousand dollars. They are both under the patronage of the legislature, and draw from the State treasury to the amount of six hundred dollars each, which amount is given with additional sums from interest on funds, in premiums. We have also a County Horticultural Society, which, though of recent formation, is exerting a good influence in introducing richer fruits, more beautiful flowers, and new and healthful vegetables. The utility of its objects are taken as a sure guarantee of its success.

Yours, truly,
WILLIAM BACON.

Hon. Thomas Ewbank,
Commissioner of Patents.

Vue de l'Eau, Bristol Co., Mass., *December* 23d, 1849.

Sir:—We have received in this section of Mass. from your predecessor, the Hon. Edmund Burke, and from our former representative from this district, Hon. Mr. Hale, our full share of the interesting and useful Patent Office Reports for 1847–48, for which we are greatly obliged. I have also received a circular for 1849, to which my attention has been very kindly solicited.

By the acts of the royal commissioners appointed by the King of England to settle the boundary line between Massachusetts and Rhode Island in 1741, a part of the ancient county of Bristol, comprising what are now the flourishing towns of Little-Compton, Tiverton, Bristol, Warren, and Barrington, justly denominated "the garden of the old colony," was unfairly severed from Massachusetts, and by a subsequent decree annexed to Rhode Island. But though Bristol county was then despoiled of a part of her most valuable territory, she has since made vast strides in improvement, and is still rapidly advancing in prosperity. She has now within her limits one populous and flourishing city (New Bedford) and eighteen large villages. The soil, like most of New England, is perhaps not the *best* in the known world; and in the interior of the county it is rather sandy and sterile, and some of it, like New Hampshire, abounds in rocks; yet, taken as a whole, it is luxuriant, and for the beauty of the scenery, the enterprise of the inhabitants, and the salubrity of the climate, Bristol is probably not surpassed by any other county in the commonwealth.

Within its present limits are about fifty cotton factories, where are annually made more than nineteen million yards of cloth; four calico factories; three woolen mills; three forges; seven rolling, slitting, and nail mills; fourteen furnaces for the manufacture of hollow-ware; ten establishments for the manufacture of cotton, woolen, and other machinery; five axe factories; one steam-engine factory; two establishments for manufacturing cutlery; five tack and brad manufactories; six shovels, spades, forks, and hoes, do.; one plough factory; one copper do.; one Britannia ware do.; one metal button do.; one glass do.; three paper mills; two clock factories; twelve establishments for the manufacture of chronometers, watches, gold and silver ware, and jewelry; six brass foundries; eighteen saddle, harness and trunk manufactories; one upholstery do.; three hat and cap do.; one cordage do.; seventeen salt do.; eighteen oil and sperm

candles do.; nine soap and candle do.; thirty-eight carriage do.; fourteen chair do.; two comb do.; one linseed-oil mill, and twenty-three furnaces. During the past year, there have been manufactured in this county one hundred and forty-seven thousand seven hundred dollars worth of straw bonnets; five thousand dollars worth of cigars; twenty-seven thousand dollars worth of building-stone; twelve thousand two hundred dollars worth of marble quarried; fourteen thousand eight hundred and twenty-five dollars worth of wooden-ware manufactured; five vessels launched, valued at fifty-five thousand dollars; and we have three hundred and twenty-two vessels employed in the whale fishery. It is estimated that there are in this county thirty-one Saxony, seven hundred and eleven Merino, and nine thousand one hundred and forty-four sheep of other kinds; five thousand three hundred and forty-two horses; fifteen thousand two hundred and eighty-five neat stock; and that our county annually produces one hundred and thirty-nine thousand three hundred and ninety-two bushels of corn; fifteen thousand one hundred and sixty-five bushels of rye; forty-six thousand seven hundred and eighty-nine bushels of oats; four hundred and twenty-nine thousand four hundred and twenty-nine bushels of potatoes; seventy-seven thousand bushels of esculent vegetables; sixty-five tons of millet; twenty-four thousand nine hundred and eighteen tons of hay; one hundred and twenty-six thousand bushels of fruit; three hundred and twenty-three thousand pounds of butter; one hundred and fifty-eight thousand pounds of cheese; one hundred and fifty-two thousand five hundred and fourteen gallons of milk; and one thousand two hundred and seven pounds of honey.

From the above, it will be perceived that a large share of the population and capital of the county is employed in other pursuits than that of agriculture. But this all-important interest is beginning to receive increased attention, not only in Bristol, but in the adjacent counties, and throughout the whole State. Those portions of Bristol county bordering on Narragansett, Mount Hope, Acushnett, and Buzzard's bays, and on the rivers flowing into the same, are among the most productive and fertile. Some other sections, however, present many of the finest specimens of highly cultivated lands. There is not much wheat sown in the county, and the quantity of oats grown for the past few years is much less than formerly. The reason assigned for this by one of our best farmers is, that these crops exhaust the land more than others. In this vicinity, rye has suffered somewhat from the severity of the two past winters; but I am not aware that there has been any material diminution of the crop, or in the fertility of the soil on which it has grown. For barley, our soil and climate are considered well adapted, but for some reason unknown to the writer, this grain is very little cultivated, and it may almost be said of it "men sow not, neither do they reap."

Maize, Indian Corn.—In this county and State much more attention is now paid to the cultivation of this grain than formerly; more land is appropriated to it, and by far greater crops are produced. The idea that it is cheaper to buy corn than to raise it is fast becoming unpopular; and the two last seasons have proved very favorable to its production. The average yield per acre was, a few years ago, not more than fifteen or twenty bushels in this part of the State; now, fifty and seventy-five bushels are not uncommon, and it is probably safe to estimate the average at from thirty to forty bushels. Green corn for soiling cattle is highly esteemed, especially for producing milk; and the corn ground into meal is deemed much more

profitable for feeding to stock than the whole grain. The probable aggregate product of the State is about two million bushels of corn; forty-eight thousand bushels of wheat; four hundred and fifty thousand bushels of rye; one million two hundred thousand bushels of oats; thirty-two thousand three hundred bushels of buckwheat; corn and rye, by statute, weigh fifty-six pounds to the bushel; barley and buckwheat, forty-six pounds; oats, thirty pounds; and wheat, sixty pounds.

Hay.—Timothy is deemed the most desirable and nutritious kind of hay, when not mown until after the blossoms begin to turn, and the seed to form. Clover and mixed hay are also considered very valuable for stock. In laying down meadows in spring, clover, timothy and redtop mixed, are usually thought best. When sown in autumn, the clover is generally omitted. One ton per acre is about the average yield.

Potatoes.—The past season has been more favorable for the growth of potatoes than that of 1848, and on account of their high price for a few years past, there probably has never been so large a quantity raised in this county in one year before. Although the aggregate crop has doubtless been eight or ten per cent. greater than the preceding year, yet much damage has been sustained from the disease. The average yield is about one hundred and fifty bushels per acre. The crop suffered much from dry weather in June and the early part of July, but those planted early and covered deep, yielded the best, and grew to the largest size.

Butter.—About eight million pounds of butter are annually made in Massachusetts. Good cows produce about six pounds per week, for from three to six months. The average annual produce from each cow varies from seventy-five to one hundred and fifty pounds. Clean, well-ventilated cellars, with stone or cemented floors, are considered by butter and cheese manufacturers as good as spring-houses.

Not many horses or mules are raised in Massachusetts. There are now in the State fifty or sixty mules, and about seventy thousand horses, the average value of which is about seventy-five dollars; some are worth but forty or fifty dollars, others range from two hundred to four hundred or five hundred dollars. Our best, most valuable, and beautiful animals are from Vermont and New Hampshire.

Of horned cattle we have about two hundred and eighty thousand in the State, worth when three years old not far from fifteen dollars per head. The pure Devon and Ayrshire are preferred. The writer of this has some Durham and Galway stock, which are very highly esteemed, and in some respects deemed superior to those above mentioned.

Sheep Husbandry.—There are not many Saxony, but more Merino sheep in this State than of any other race. Amount of wool clipped in the year is about one million and twenty thousand pounds. Average weight of fleece three pounds; price varies from thirty-five to fifty cents per pound. It is not known that they are often molested by dogs, but for various reasons, this branch of industry has never been very extensively prosecuted in Massachusetts. Plaster and lime are but little used as fertilizers in Bristol county. The farmers rely more upon compost and stable manures, and the various marine substances, such as sea and rock-weed, or kelp, &c.

Orchards and Fruits.—I have only time to add that great and increased attention is being given to cultivation of all kinds of fruits. Farmers are beginning to see the importance of raising fruit for the market, and in the suburban districts are already realizing considerable income from this branch

of industry. The beautiful specimens of fruit at our Agricultural and Horticultural exhibitions very clearly evince the growing importance everywhere attached to the selecting and planting of orchards and trees, and to all that pertains to the advancement of Horticulture.

In conclusion, allow me to say that I have forwarded copies of your circular to my very worthy and distinguished friends, and neighbors, the Hon. Tristam Burgess, and Captain Martin Page, both of whom are scientific and skillful agriculturists; and I trust they will furnish you with more accurate and acceptable information than is contained in the above report.

With great respect,
I have the honor to be
Your obedient servant,
JOHNSON GARDNER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

WESTERN CONGRESSIONAL DISTRICT,
NORTH KINGSTON, R. I., *Dec.* 1849.

SIR:—This State is divided into two districts, by a line passing through Narragansett Bay, from north to south. This district is composed of the counties of Washington and Kent, and parts of Newport and Providence counties. As no estimate of the agricultural products has been made since the census of 1840, I have no data to predicate an opinion, or sufficient information to give a statistical account of the recent crops with any degree of accuracy, and shall therefore confine this communication to some remarks on the season, the soil, and such crops as are usually cultivated.

The land on the seaboard in its primitive state was very productive and easily cultivated; and it appears that the original proprietors formed the same opinion of the durability of the soil that many do at the present day, who have located on the fertile lands of the west, that the soil is inexhaustible, and will never need replenishing. They pursued the exhausting system of cropping without manure, until the products would not pay the labor, and would then flee to new regions to obtain a subsistence. But since the commencement of the present century, a spirit of improvement has been manifested in replenishing and fertilizing the worn-out soil. The tide of emigration has been very much checked (with the exception of the California fever, now carrying off some of our population), and the state of agriculture has received a new impulse. It is the opinion of our oldest and best-informed citizens that the agricultural products on the seaboard have increased more than one hundred per cent. within forty years. Great attention is now given to making and saving manures. Many farmers think as much of preparing the compost heap for the spring as they do of securing the crops in autumn. This district has more than one hundred miles sea-coast, including two islands that form townships. Large quantities of marine substances are annually thrown upon the shores, which formerly were considered of but little value, but now all are husbanded to the best advantage. Our bay abounds in menhaden fish, which are taken in great quantities, and converted into a very fertilizing manure.

The Seasons.—The spring opened earlier than usual. The farmers commenced operations in March, but the latter part of the month was very rainy and blustering. April was favorable for getting in early crops; rather pleasant, with a medium quantity of rain. May was very rainy, accompanied with cold, chilly winds and little sunshine, but no frost. The forepart of June was showery and cool till the 10th, when the atmosphere became serene and warm, and vegetation came forward rapidly until it began to feel the want of rain. July came in hot and dry, and it continued so through that month till the 10th of August, which occasioned the most severe drouth that has been experienced in this section for many years. Not more than *one inch* of rain in sixty days; and for a number of days in succession the mercury rose to 95° in the shade, extreme height 100°. From August 10th to the close of the season, there was no lack of rain for vegetation; but the streams remained low till the middle of October. The autumnal months have been very favorable for maturing late crops and securing the harvest. The first killing frost was October 15th; and the ground was not frozen sufficiently to obstruct the plough till December.

Crops.—Wheat, barley, and buckwheat, not raised to any extent worth noticing. *Oats* are raised in small quantities, but considered an unprofitable crop. Average yield twenty bushels per acre. Price about forty cents per bushel.

Rye has received increased attention within a few years. Many farmers who formerly raised none, have had crops of thirty or forty bushels per acre. Within the last ten years, the production of this article has nearly doubled. Average yield not exceeding fifteen bushels per acre. Fall sowing does best; usual time September, and harvest in July—seed one bushel per acre. Domestic price one dollar.

Indian Corn is more extensively raised than any other grain crop. The white variety is mostly cultivated, and invariably commands a higher price for breadstuff than the yellow. Time of planting, the last of April and first of May. Harvesting depends very much on the season for ripening, usually the first of October. Average yield per acre on the seaboard thirty-five bushels—but in the interior considerably less. Our farmers have competed for premiums with crops from eighty to over one hundred bushels per acre. The crop the past season was fifteen per cent. short of an average, occasioned by the severe drouth. On clay or gravelly portions of the fields, it was a total failure. The price ranges from seventy-five cents to one dollar; at present eighty cents.

Potatoes have been more extensively cultivated since the appearance of the disease than before. Notwithstanding some localities have been severely affected by the malady, yet on the whole, in a pecuniary point, we are the gainers. Our farmers realize more from the sale of potatoes than any other crop they produce. Previous to the rot, the price was from twenty to twenty-five cents per bushel; but since, it has ranged from forty cents to one dollar, and in some instances still higher. Average for the last six years not far from sixty cents. It is estimated that the whole loss since the commencement of the disease will not exceed twenty per cent.; while the price has advanced one hundred and fifty per cent., and quantity produced greatly increased. Our proximity to navigable waters gives us a very favorable location for the potato trade, as we have but little land carriage. It is estimated by competent judges that the product over the consumption for the last five or six years has been more than one hundred thousand bushels annually, which have commanded good prices and a ready sale in other markets. The crop the past season suffered less by the rot

than in any previous year since its appearance; but owing to the severe drouth and extreme hot weather, was at least thirty per cent. short of an average, which is about one hundred bushels per acre. Time of planting from the first of April to the last of May. Early planting is now preferred, as the crop is more liable to escape the blight. Seed per acre from ten to fifteen bushels.

ROOT CROPS.—*Turnips, beets, and parsnips* are raised for culinary purposes, and the former by some farmers for feeding; but the turnip is considered more valuable for stock than any other root. The cultivation of onions is on the increase. They are raised in fields from four acres down to a garden spot. On a loamy, moist soil, well manured with good tillage, the average yield is four hundred bushels per acre; but nearly double that yield has been reported to the Agricultural Society; customary price forty cents per bushel, but owing to the short crop occasioned by the drouth, they are now selling at fifty cents for shipping. Some attention is given to the field culture of carrots. This crop requires a sandy, deep soil, and not very moist. Average yield five hundred bushels per acre, and some extra crops over one thousand. Average price twenty cents per bushel. Some of our root-cultivators raise onions and carrots together in alternate rows, and get larger crops than when grown separately.

Hay.—The early drouth the past season cut this crop short twenty per cent., but the favorable weather for curing it gave us an excellent quality, which in a great measure will make up the deficiency in quantity. Average yield nearly a ton per acre. Some meadows highly manured produce three or four tons per acre. Price from twelve to fifteen dollars per ton.

Fruits.—Increased attention has been given to orcharding within a few years, and especially to the improvement in the quality of fruit. Apples, pears, peaches, plums, cherries, &c., are raised in fruitful seasons, in sufficient quantities to supply our domestic markets.

Dairy.—Our farmers are not extensively engaged in this branch of husbandry. Butter and milk for the supply of our villages and seaports are the principal articles in the dairy line. Very little cheese is made for market, but many farmers make their own family supply. The average yield of cows about thirty dollars a season, but some forty or fifty dollars. The price of butter will average twenty cents per pound.

Stock.—Cows compose the bulk of our stock. The calves are mostly slaughtered at four weeks old; but a small part are raised, which makes us dependent on other States for a supply. Herds of young stock are brought in by drovers, and sold to our farmers at a price below the cost of raising here. The profit of a cow one season will purchase two head of young stock two years old, which if the farmer had to raise, would deprive him of the use of a cow two years.

Oxen and horses are kept for domestic purposes. Most of the farm teaming is performed by oxen, and the manufacturing teaming by horses. Average price of cows twenty-five dollars, oxen thirty dollars a pair. Sheep are on the decrease, being less profitable than cows.

Swine.—Nearly every farmer produces his own pork, and some to supply the domestic market, but none for export. Price by the whole hog, from six to eight cents per pound.

Poultry is raised by nearly every farmer, and considered a profitable branch of business. Over and above our domestic consumption, it is estimated that more than one hundred tons are annually sent to Boston, and

other markets. Eggs are produced in abundance. Domestic prices of poultry ten cents per pound. Eggs twelve and a half cents per dozen.

Wages.—Farm labor by the season from twelve to fifteen dollars per month, and board. Mowing one dollar per day. Mechanics from one to two dollars per day. Female domestics one to one dollar and a half per week.

Agricultural Society.—The Rhode Island Society, for the Encouragement of Domestic Industry, was incorporated in 1820. During the first twenty-five years of the existence of this society, its benefits were duly appreciated by the agricultural community. The liberal premiums annually offered created such a spirited emulation amongst our farmers, that soon a new system of agriculture was substituted for the old traditional customs. But, for the last three or four years, the exhibitions have been less attractive, the displays at the fairs much diminished, and many premiums offered without a claimant, which is shown by the enclosed report, made by one of the committees, that had the disposal of two hundred and thirty-one dollars in premiums, and only thirty-five dollars claimed, and that without competition.

This falling off is attributed more to the want of novelty than the lack of enterprise. The sameness of the exhibitions has caused such a careless indifference that but little benefit results from the annual fairs, for which reason none was held this year. I have heard of no complaint against the officers of the society, and am fully confident that they would rejoice at the opportunity of distributing the annual proceeds of the fund, if it was only sought for and duly appreciated by those for whose benefit it was designed. The society has real estate which cost five thousand dollars, and a permanent fund of eleven thousand six hundred dollars, well invested in bank stocks that pay from six to seven per cent. Officers of the society, Hon. John Pitman, President, and Elisha Dyer, Jun., Secretary. Both reside in Providence.

Yours, very respectfully,
J. G. CHADSEY.

Hon. THOMAS EWBANK,
Commissioner of Patents.

NEW LEBANON, N. Y., *January 15th*, 1850.

SIR:—Your circular requesting statistics of agricultural products, improvements, &c., was seasonably put into my hands for report thereon, and ought to have received earlier attention, but circumstances beyond my control have delayed my efforts until the present moment; and I am not now able to do justice to the cause, or to the public, but will, nevertheless, make out statistics relative to such points in your circular as the society of Shakers located in this town are best able to attend to. The Shakers, moving as they do, in a body, in all business of importance, improvements are slower of introduction among us than among individual farmers in the country generally; but we think we can say, nevertheless, that when an improvement is once thoroughly introduced, it is perhaps more permanently maintained.

The arable lands belonging to this community are, in the main, located on the west side of a mountain, of such steep declivity that those situated above the village (which is situated about midway the descent on a narrow table of land) are inaccessible to manuring, except with green crops; hence there is not, on the whole, any essential improvement of these portions of our

possessions, some sections improving in value by judicious treatment, of turning in green crops, rest, limited depasturing, &c. &c., others more closely cropped and less judiciously managed are deteriorating. The soil is generally what would be properly called an argillaceous loam of moderate tenacity, varying generally from three to nine inches in thickness, and resting upon a hard pan, moderately penetrable with the plough, and susceptible to conversion into soil by trench ploughing, exposure to atmospheric influences, and the action of animal or vegetable manures. It is retentive in a moderate degree, and susceptible of great improvement. The soil is principally adapted to wheat, and some sixty years since as large crops of wheat were taken from it, perhaps, as from any in the State of New York, thirty bushels to the acre being a very common yield, and sometimes sixty bushels to the acre have been raised, and that within twenty years past; but the average of wheat was formerly perhaps about twenty bushels—and some crops of late years would average nearly as much, but at present wheat seems to require manure to stand the winter and make a good return, and, as the attention of the society is much engrossed in horticultural pursuits, raising garden seeds and herbs for foreign markets in the States and in Europe, the manures are chiefly expended upon the gardens, somewhat to the detriment of the farm as a whole. Therefore wheat is now seldom cultivated.

Oats are raised extensively, and their cultivation is becoming, on the whole, rather more popular, although some portions of the community, perhaps, raise less than formerly; with improper management they seem to be a scouring crop, but when suitable attention is paid to prepare the soil by grass lays, green or dry, the latter of which is preferred, the soil seems not to be essentially drained; and as oats generally give a fair return on thin soil, they are much cultivated, and used to mix with barley and corn, in equal proportions for provender. They are also used clean, for horses principally, as corn is considered with us too heavy for that purpose.

The different kinds cultivated are the common or tassel oat, the barley oat, and the black oat. The two latter kinds, though making the greatest yield in some sections, seem more inclined to lodge and injure by rust, and are consequently slow of introduction.

Opinion is conflicting as to the merits of the different varieties; the common oat, however, is generally preferred. The average yield is from thirty-five to forty, and sometimes fifty bushels to the acre, generally sown on green sward turned late in the fall, and simply harrowed, but generally with less success. As to the value of oats, compared with other grain, no accurate experiments have been made, as with us they are generally fed mixed with barley and corn. Two bushels of oats are generally considered rather better than one of barley as feed; though in the market one bushel of the latter grain is worth more than two of oats. From three to three and a half, and even four bushels are generally sown here to the acre. The comparative value of corn and oats is as one to three.

Rye is very little cultivated; most of the lands belonging to the society will not grow it to advantage. There are crops, however, sown upon some sections of our lands annually, which yield an average of twenty bushels per acre. No essential diminution of crops has been observed of late. It is entirely consumed at home, and mostly for bread.

Barley.—This crop is extensively cultivated here, as it gives a better return for labor on land of moderate strength than any other small grain, and is the very best for seeding with grass, as it comes off so early in the season, usually about the middle of July. It is much used in our State for the manufacture of ale. But our society not consuming this, or other fermented or spirituous liquors, it is exclusively used as provender. The four-rowed and the six-rowed are both cultivated among us, but the latter much preferred.

In our system of rotation, barley always follows a hoed crop, as it seems to do best on a subdued soil, and it will even make a better return on the poorest of land succeeding a crop of oats, than on a green sward reversed. Of course, the yield varies with seasons and soils: with us for fifty years past it has ranged from thirty to eighty bushels per acre, and has averaged forty-five during that period.

Maize.—As to varieties they are so fluctuating as hardly to be recognizable; the kinds cultivated here are usually of northern origin, or such as belong to the Middle States. Northern or Canada corn for early or green corn, and the other kinds for the main crop. The eight-rowed, and twelve-rowed varieties are mostly used. A kind called Dutton is in most esteem just now, as it ripens some days earlier than any other variety of equal growth and weight with which we are acquainted. This grain, according to our experience, is liable to great changes of character from the action of soil, climate, and manures; a warm, quick and strong soil, so materially hastening the growth and maturity, as to make it difficult to recognize the same variety when grown on different soils. We have two modes of culture:—1st. A green sward reversed with compost broadcast, and well harrowed. 2d. Fresh or long manure spread on the sward, then ploughed, harrowed and rolled. Manure at the rate of thirty-five or forty cart loads to the acre. The young plants are dressed with unleached ashes, and if in slaty or sandy soils, with plaster. Our clay soils generally are very little benefited by plaster, whereas the product of our slaty hill-sides or gravelly and sandy knolls is nearly doubled by its application.

As regards the comparative value of shuck and blade, we are not prepared to offer an opinion. The stalks well cured and chopped are considered for cattle equal to a medium quality English hay. As they frequently mould in curing, they are not given to milch cows, as they might communicate a disagreeable flavor to the milk, and they are fed to young stock and dry cows. Green corn for soiling, especially milch cows, is considered superior to any other forage; but we are unable to state its value as compared with clover and grass.

The experience of more than thirty years leads us to estimate *ground corn* at one-third higher than *unground* as food for cattle, and especially for fattening pork; hence it has been the practice of our society for more than a quarter of a century to grind all our provender.

The same experience induces us to put a higher value upon cooked than upon raw meal, and for fattening animals, swine particularly, we consider three of cooked equal to four bushels of raw meal.

Until within the last three or four years, our society fattened annually for thirty years from forty to fifty thousand pounds of pork, exclusive of lard and offal fat; and it has been the constant practice to cook the meal, for which purpose six or seven large potash kettles are used.

Hay.—We can only speak of this crop from general observation, and would say that our first quality hay is an admixture of one-fourth clover and three-fourths timothy; yield per acre from one to four tons, according to soils and seasons. Cut at the shedding of the blossom, wilt one day in

good sun, then cocked and allowed to stand until done heating—then sunned an hour or two and housed. Thus cured it is invariably bright, sweet and fine, and the labor is less than in the common tedding method.

The practice of irrigating meadows is rapidly giving place to draining and ploughing, though in the opinion of many good judges irrigation under favorable circumstance is of advantage.

Peas are confined to the garden.

Root Crops.—Turnips are only raised for the table. Rutabagas and French turnips have been extensively grown for stock, but now we grow carrots and sugar-beets. Of these latter, we have frequently gathered from seven to fourteen hundred bushels per acre; and we esteem them highly for milch cows, to which they are almost exclusively fed. Carrots are growing in favor among the farmers of our State and with the society, and our community vends perhaps more *bushels* of carrot seed per annum now than it did *pounds* ten or twelve years ago.

They are exceedingly wholesome, and fully equal if not superior to potatoes. Irish potatoes are still very much affected with the rot, and our crop has been reduced to a fourth of what it was formerly; and notwithstanding multitudes of experiments, no preventive to be relied on has yet been discovered.

Butter.—One of our dairies with forty cows has produced the past year six thousand one hundred and eight-five pounds of butter, three thousand seven hundred and forty eight pounds of cheese, and many hogsheads of milk used in its natural state. This is an average of one hundred and fifty-four and a half pounds of butter, and ninety-three and a half pounds of cheese per cow per annum. The other dairies though not producing so much will come near it.

These cows are fed with shorts or chip-stuff, together with roots, and slops from the kitchen, twice each day, say four quarts each of the former and a pailfull of the latter. Some of the cows are soiled, others run to pasture; but soiling is preferable most of the season.

Spring-houses are preferred to cellars for setting milk; ice is much used.

Sheep.—We raise no great quantities of wool for sale. The prevailing races among us are Leicester, Bakewell, Saxon, Merino, and a mixture of all.

Hogs.—The average weight of our hogs for the last twenty-five or thirty years, and fed in the manner heretofore stated, on boiled Indian meal, has ranged from four to five hundred pounds and upwards, at eighteen months old. From experiments made some years since, one bushel of corn at fifty cents, together with kitchen slops per head to a large herd of swine, produced an average of over twenty pounds of pork exclusive of lard. Our estimates of cost have not been sufficiently accurate to be given to the public, but the general conclusion is that, with prudence and economy, pork raising is profitable in our vicinity; but without these there must be loss.

Rain, in each month during the year 1849:—

	SNOW.	RAIN.		RAIN.		SNOW.	RAIN.
January,		$\frac{5}{8}$ in.	May,	$2\frac{1}{4}$ in.	Sept.		$\frac{1}{2}$ in.
February,	14 in.		June,	$2\frac{5}{8}$ "	Oct.		7 "
March,	3 "	8 "	July,	$1\frac{1}{4}$ "	Nov.		$3\frac{3}{8}$ "
April,		$1\frac{1}{4}$ "	August,	$6\frac{5}{8}$ "	Dec.	13 in.	

Snow 30 inches. Rain $28\frac{1}{4}$ inches during the year.

Lime is little used as a manure in our vicinity, ours being a limestone soil, and generally sufficiently impregnated with lime. Reclaimed swamps abounding in vegetable matter are evidently benefited by a dressing of one hundred bushels of lime per acre.

Old orchards, nearly superannuated, have been much improved among us within a few years past by heading in and grafting, together with scraping. Shallow ploughings given annually, liquid manure, chip-dirt, road scrapings, sawdust, &c., have been turned in with marked advantage. Some young orchards have been recently set, which are doing well from the land being constantly under tillage. Various theories have been suggested by nurserymen and orchardists for protecting young trees from the ravages of rabbits, mice, &c. Gas tar has been recommended; but to our sorrow, we found it to be a positive injury—to such an extent, indeed, as to cause the death of many fine trees in a beautiful young orchard of ten years from the bud.

Doubtless there are various qualities of this tar, but that which we were recommended to use seared the bark to the wood, increased the action of the sun's rays to almost a burning point, and stopped up the pores of the bark, which need as much to be open to atmospheric influence as those of the skin of an animal.

All coatings on the limbs or trunks of trees, which entirely exclude the action of the air and moisture, are certain death. Should any doubt this statement, let them take a cloth dipped in common grafting cement, say ten inches in width, and wrap it perfectly tight around the trunk of a young apple-tree, two inches in diameter, near the surface of the ground, and partially cover it with earth, and we will guarantee the tree to die.

Setting of apple or pear-trees should be done early in autumn after the fall of the leaf on the first growth; if some leaves on the second growth are green, it is all the better. *Mulching*, that is, spreading a few inches of litter over the roots after the tree is set, is of incalculable advantage; and we have thus transplanted orchards, which grew as well the season after a fall transplanting as before.

Other matters in your circular we are not able to make any satisfactory returns to, and fear that the above is of little value, because not sufficiently explicit.

Statistical information on the points mentioned in your circular is by far too much overlooked, and I regret my present duties are such as to prevent my obtaining all the information on these subjects which would be agreeable to the Commissioner, to the public, and to the undersigned, a well-wisher to all public and private enterprises truly valuable to mankind.

With due regard, I remain your friend,

In the common cause of Universal Improvement,

GILES B. AVERY.

To the Hon. THOS. EWBANK,

Com'r. of Patents.

PENN YAN, YATES CO., N.Y., *January 1st*, 1850.

DEAR SIR:—I herewith transmit you, agreeably to solicitation, a few statistics together with some other matters relating to agriculture, as called for in your circular of July last. And permit me to state that it will be impossible to confine myself strictly to the requirements of said circular, and I shall therefore beg leave to make mention only of such facts as

have come to my knowledge, together with such suggestions as shall seem to me best calculated to assist in carrying out the many and very worthy objects you have in contemplation. Residing as I do, in one of the interior, and perhaps the smallest county of western New York, my field of observation has been from necessity somewhat limited, and the few suggestions I offer will be drawn from facts and ideas somewhat local.

The agricultural condition of western New York is gradually on the advance, taking it as a district. Some counties far outstrip others in many and important respects. The causes are more or less owing to the bringing of more land from year to year under cultivation, but perhaps the greatest are *deeper ploughing*, and more thorough tillage consequent upon a more general use of the many valuable improved farm implements, together with a wider spread of agricultural intelligence and scientific knowledge, and the application of the same to the soil. Farmers are becoming gradually more particular in their farm management; they begin to see in some degree the good effects of under-draining; they are more saving of manures, and there is a greater willingness on the part of all to test the virtues of the drill, the cultivator, and the many labor-saving implements so valuable in the putting in and after culture of their various crops.

This is strictly a grain-growing district, and, as exhibited in the following table giving the principal products of our county (Yates), it will be seen is from year to year rapidly on the increase. I have compared the products as returned this year with those as shown by the last State and also those of the last National Census.

	1840.	1845.	1849.
Total wheat crop	352,000	408,069	627,402
" Barley "	31,000	71,000	167,848
" Oats "	161,000	224,673	268,046
" Corn "	104,000	136,000	289,200
" Number of Sheep	86,000	130,000	125,605

The wheat crop of the past season has been universally good, with the exception of a few counties where the weevil has been more or less destructive; there was much to favor and nothing to retard its growth or prevent its ultimate perfection—it stood the winter remarkably well; no rust or other malady befell it, and the summer drouth had the effect only to hasten the time of harvest, which occurred from a week to ten days earlier than usual.

The summer crops were more or less injured by the drouth.

The kinds of wheat heretofore most highly approved were "red-chaff," "crate" and "Hutchinson," but they have in a great degree given place to the more certain, bountiful, and least liable to destruction, the "white flint," and "Soules." I perhaps should except the ravages of the weevil, which in some instances were confined almost wholly to the flint wheat, while other varieties growing side by side escaped uninjured. The crop this year in western New York will not fall below fifteen bushels per acre; that of Yates county has been ascertained to be about eighteen bushels. Spring wheat is considered a poor crop; it is a heavy exhauster, and unless the season is remarkably propitious, a failure is almost certain. The price wheat has commanded in our markets has ranged for the last crop from one dollar to one dollar twelve and a half cents per bushel.

Barley.—Western New York is perhaps as justly celebrated for its barley

as its wheat. The crop has not been as heavy as usual, owing to the severe summer drouth; it will be seen, however, that it is greatly on the increase, while in most of the barley-growing counties, particularly in the eastern part of the State, it is gradually on the decrease, both in quantity and quality. It is considered the best, if not the most profitable spring crop cultivated. It leaves the ground generally in a loose, moist and permeable state, free from weeds, and is generally followed by winter wheat. The soil best adapted is a deep sandy loam, and it is not considered so great an exhauster of the soil as either oats, flax, or spring wheat. The price in market for the present crop has ranged from forty-five to fifty cents per bushel.

The corn crop is never large, and is principally raised for home consumption. In the fattening of pork and beef it is consumed to a very great extent, being crushed or ground, "cob and all," the cob affording or giving a greater bulk, besides adding some considerable nourishment. The average per acre is from forty to fifty bushels. The kind mostly produced is the "eight-rowed yellow;" but whenever the "long white flint" has been thoroughly tested, it has met with decided approval, as there are generally more sound ears upon a hill, and they are at least a third longer. Farmers are opposed to it purely upon the ground of its color, as they suppose it cannot, from that fact, contain as much fattening properties as the yellow. Market price fifty cents per bushel.

Oats are generally considered too great an exhauster to be cultivated to any considerable extent, other than for home consumption. The "long white" is most commonly produced in this section; it scarcely ever yields more than an average of thirty-five to forty bushels per acre, and it is quite an uncommon occurrence for it to hold out weight (the standard being thirty-two pounds to the bushel).

I am quite confident, however, that I have succeeded in the cultivation of a kind raised by me, and known as the "Imperial Oats." A few seeds were received by me from the Patent Office in the winter of 1846, from which I have annually harvested a crop to my perfect satisfaction, and have of the present crop about one hundred bushels for seed and distribution among my friends and neighbors. The berry is short, remarkably plump, and white; the yield per acre is good, the straw not large, never having been known to lodge unless blown down by storms; but their chief merit is in their weight, which is never less than forty pounds to the bushel, and as far as I have been able to test them, they are not disposed to deteriorate in any respect.

The past season, I tested them with the common kind, and received the following results:—

"Imperial oats," 1 acre, 51 bushels, weighing 40 pounds; or at 32 pounds to the bushel, 63 bus. 24 lbs.

"Common oats," 1 acre, 40 bushels, weighing 31 pounds; or at 32 pounds to the bushel, 38 bus. 24 lbs.

The result showing decidedly in favor of the "Imperial," having a two-fold advantage, first a difference of eleven bushels by measure, and secondly a difference of fourteen pounds by weight, making twenty-five bushels per acre in favor of the "Imperial oats."

Rye is not grown to much extent, if at all; the soil is not adapted to it. It is not, and cannot be made, a profitable crop unless upon *light soils*, and that is what we, as a district, are not particularly blessed with.

The *Potato crop* this year is moderate, chiefly owing to the unusually small

number of acres under cultivation; farmers having been nearly discouraged in the cultivation of the same, from the fact of its almost certain destruction or failure by the rot, from year to year; but through the interposition of a kind Providence it has, at least for the present crop, been averted, as not the first instance of the malady has come to my knowledge. The average per acre is from eighty to one hundred bushels.

The amount of seed used in planting, in order to produce the greatest yield, has been to me for some time a matter of doubt; some farmers contending that ten bushels per acre is none too small, others fifteen, and some even go so high as twenty bushels. But from a series of experiments for several years past, I am convinced that in this small county there is annually a waste or throwing away in seed of no less than ten thousand bushels. In the year 1847, an experiment was made by me, which has on each returning spring been repeated, and proved to my perfect satisfaction. It was as follows:—I took about three-fourths of an acre of deep sandy loam, well manured, and every portion equally well ploughed and thoroughly cultivated, and on the 2d of May, planted the same in rows and hills, north and south, three feet by two, in the following manner:—

Two rows with long pink eyes,	2 whole potatoes in each hill.		
" " "	1	"	"
" " "	2 seed ends		"
" large flesh-colored,	3 potatoes		"
" " "	1	"	"
" " "	2 seed ends		"

The after culture being the same, on harvesting the crop, to my astonishment, I could not discover the slightest difference in any respect, either as to quantity or quality.

It will be seen than when the "seed end" merely answered for seed, that at least two-thirds of this valuable esculent is saved; and I may safely say that four bushels of seed will, under ordinary circumstances, be sufficient to plant one acre of ground; and the product will be equal in amount to that produced from twenty bushels of seed, when the whole, or any number of potatoes to each hill, are planted. The ordinary price in this market is from twenty-five to fifty cents.

The crop of *hay* the past season was good, the kinds usually cultivated being clover and timothy. The clover is preferred for consumption upon the farm, while the timothy takes the preference in our city and village markets. Clover is usually cultivated upon the high rolling lands, the timothy is confined mostly to low lands. The average per acre is from one and a half to two tons. Market price in cities and villages from eight to ten dollars; in the country from five to seven dollars.

The cultivation of good fruit, until within a very few years past, has been, to farmers in particular, a matter of secondary importance; a few, however, I am happy to say, are beginning to open their eyes and their *mouths* to the subject, and through the medium of both, it is to be hoped that sufficient interest and activity will be aroused to bring about an improvement so long and ardently wished.

This perhaps is the best fruit-growing district of the State; but the past year has been almost an entire failure, the spring frosts effectually destroying early fruit of every description—a few favorable locations only being spared. Farmers are beginning to trim up and graft their old orchards; others are setting anew the earliest and best varieties; and on each returning spring and fall is brought to his door the nurseryman's wagon, laden with the choicest and best varieties of fruit trees, shrubs, and plants; so that no man, who, in this day of progress, is the happy possessor of a rod square of his mother earth, can offer a good and sufficient reason why he or his children should be deprived the privilege or the pleasure, at some future day, of "sitting beneath his own vines and fig-trees," and eating in peace fruits purchased by his own labors and good sense.

From the fact of this being a grain-growing district with but the exception of a few counties, the dairy is a secondary branch of farm management. The average number of pounds of butter per cow in milk is not far from one hundred, commanding in our city and village markets from twelve to fifteen cents per pound. The county of Alleghany, I believe, has the credit of manufacturing the best and perhaps the greatest amount of cheese.*

With few exceptions, there is a manifest inactivity and want of pride in regard to the improvement and introduction of improved breeds of stock of all kinds. In the county of Yates, I am not aware that there is the first full-blood breeding animal of any description, unless it be the full blood *land-shark hog.* The native stock however is as good as native breeds in general. Many very valuable droves of half and quarter-blood Durhams, and Devons are picked up by drovers in the counties of Genesee, Livingston, Chautauque, and Cattaraugus; but the great amount of cattle are native, some of which are very good.

Labor-saving implements are beginning to be used pretty generally. Some of those most highly approved are Hussey's Reaper; Benton's, Hall's and Ewings' Horse-Power; Hathaway's, Hall's, and Ewing's Threshing Machines; Ketchum's Mowing Machine, and Sherman's and Palmer's Wheat Drills.

There are a great variety of ploughs in use in this section, and each one has its advecates, and each in its turn is pronounced by its admirers to be the best. In order to test the relative merits of these in this immediate section, a plough trial was made under the direction of the Seneca County Agricultural Society, in August last, with the following results:—

		lbs.
Burrell's Ontario Co. Small-wheel Plough	(by stationary power),	345
" " " " No. 2	"	356
" " " " " 5	"	295
" " " " " 6	"	290
" " Land-side Plough, No. 2	"	427
" " " " " 4	"	485
Yates Co. "Penn Yan Plough,"	"	355
" "Dundee Plough,"	"	441
Ontario Co. "Buckeye", or "Iron-beam Plough,"	"	372
"Seneca Co. Plough,"	"	415
"Crain Plough,"	"	493

Agreeably to a suggestion in your circular, I herewith transmit you an abstract from a Meteorological Register kept by Dr. H. P. Sartwell, of this place, giving the mean temperature, and also the amount of rain for each month of the year; and I am told by this close-observing and truly scientific gentleman, that the amount of rain the past year is much smaller than usual, and that the quantity for the last twenty years has not been over twenty-eight inches per year.

* The writer is in error in supposing Alleghany produces the most cheese. That honor belongs to Herkimer.

	Mean Tem.	Amount of Rain Inches.
January	22°.12	.57
February	21°.14	.54
March	33°.64	.85
April	40°.96	.48
May	52°.22	3.12
June	64°.63	2.20
July	66°.77	1.60
August	67°.22	1.69
September	58°.60	1.87
October	46°.32	6.29
November	44°.66	2.88
December	27°.25	1.38

Mean for one year 45°.46 Total rain 22.97

It will be seen from the above table, that in the one month of October there fell nearly as much rain as in the *seven* months of Dec., Jan., Feb., March, April, July and September.

I have thus carefully enumerated the several branches embraced in your circular as applicable to this section of the Empire State, in as concise and lucid a manner as the subject would admit; and I trust with that candor and fairness so requisite in a matter of this character. It is hoped that it will meet your approbation, and aid in some small degree in the promotion of agriculture. I remain yours, respectfully, &c.,

CHARLES LEE.

Hon. Thos. Ewbank, *Com. of Patents.*

N. B.—I take the liberty to append to my report the agricultural statistics of one county in Western New York for the past year, and which I may venture to say is a pretty fair criterion in relation to many others.

Report of the Agricultural Condition of Yates County for 1849.

ESTIMATED PRODUCTS.

	Acres cultivated.	Quantity of seed per acre.	Quantity raised per acre.	Cost of cultivation per acre.	Time of sowing or planting.	Kinds produced
Wheat	33,818	1¾	18¼	$8 75	Sept. 1st to 20th	Flint and Soule's
Barley	8,172	2	20¾	4 50	April 15th to May	Six rowed
Oats	8,945	2½	29¾	4 00	May 10th	Long white
Rye						None returned
Buckwheat						
Indian corn	7,640	6 to 8 qts.	28½	8 38	May 10th to 20th	Eight rowed yellow
Flax						None returned
Hay	14,538		1¾ tons	1 25		Clover and timothy
Potatoes	1,419	11½	80	7 00	May 20th	Flesh-col. and pink-eye
Root crops						None returned
Pod fruits						"
Grass seeds						"
Dried fruits						"
Pears						"
Apples						"
Maple sugar						"

ESTIMATED PRODUCTS.

	No. of lbs.	No. cows in milk.	No. of fowls.	No. of eggs.	Hives of bees.	Pounds of honey.
Butter	763,859	7,900	86,000	63,000 doz.	None returned.	26,940
Cheese	None returned.				"	
Poultry						
Eggs	"				"	
Bees	"				"	

LIVE STOCK.

	Number.	Breed.	Average weight of fleeces.	
Bulls	229	Native.		Present population 22,000
Cows	8,061			Total number of cows 210,000
Steers	2,206			Real and personal estate 4,400,000
Oxen	990			County tax $21,000
Heifers	1,760			
Calves				
Bucks	125,605	Saxon, Merino, and Native.	3lb.	
Ewes				
Lambs				
Horses	6,958	Native.		
Swine	18,805			

The kind of manure used—barn-yard and gypsum.

WAGES.

Per month.	Per year.	Per day.	Per week.
$10 to 14.	$150.	75 to $1 25	$1 Female.

Orleans, Jefferson Co., New York, *December* 15*th*, 1849.

Sir:—Before answering the questions proposed in your circular, I will observe, that I must confine myself in my replies to this region, and that in the estimates which I have made of the cost of raising, yield per acre, or average weight of the several crops, I have not taken into account any extra labor bestowed upon the land, such as rolling after covering the seed with the harrow, draining, &c.; as these expenses soon pay for themselves by the increased yield per acre.

All spring grains, when sown from the 15th April to 10th of May, usually give the largest and heaviest crops. Corn should be planted from the 10th to the 20th May; and Black Sea spring wheat does best if sown about the same time. The singular weather during the past season in this neighborhood prevents my giving favorable details as to the amount of grain raised in this county. Never since the settlement of this section of the country, have the farmers been so poorly repaid for their labors. The spring opened late and wet, ploughing was delayed, and most crops were put in later than usual. From June until October, they suffered from severe drouths, the occasional light showers at long intervals, doing little or no good to vege-

tation. The consequence was that the crops of rye, corn, spring wheat, peas, and barley cannot be estimated at much more than half an average crop in this county. Potatoes remained healthy; on account of the disease in former years, a less quantity was planted, and there not being moisture enough above or below ground to aid fermentation or corruption, they escaped the rot; but the product of this county cannot be more than one-half the usual quantity raised.

Our county has a very flourishing Agricultural Society, and, I believe, one of the oldest in the State. It awards, yearly, premiums to the amount of five hundred dollars. The 44° of latitude passes nearly through the centre of Jefferson County; and the Black River, which runs westerly along that parallel, with a fall of four hundred and eighty feet at various points from Carthage to Dexter, about twenty-four miles, constitutes the immense and central water-power of the county; which at no remote day, will establish a continuous line of factories and villages along that river. Washed on the north and west by the St. Lawrence and Lake Ontario, Jefferson County covers an area of seven hundred and twenty thousand, five hundred and seventy-four acres of land, now divided into twenty-two towns, nine of which are south of the Black River, and the remainder north of it.

The face of the country south of this river is rolling, beautifully diversified by hills and dales; in some parts somewhat broken by gulfs, and in others stretching out in rich and level fields.

The land is generally well watered by durable springs, and the soil is of a loose, gravelly or loamy texture, well adapted to spring crops. These towns produce large quantities of butter and cheese of good quality, and in some places winter wheat.

The northern towns, lying on a limestone sub-strata, are mostly level, or gradually rising in table lands, not so well watered by lasting springs during the dry season. They are, however, annually increasing the dairy business; supplying by art and labor the running water which is denied by nature. They already produce butter and cheese equal in quality to those made in any other part of the country. Some years ago, before the weevil or wheat-midge made its appearance, these northern towns produced large crops of winter wheat. In 1840, the crop of winter wheat in this county amounted to four hundred and six thousand, seven hundred and twenty-one bushels—since that time the produce has gradually diminished, and the culture of it is now nearly abandoned. In 1842, our wheat fields were somewhat injured by the Hessian fly; but I have never heard of this insect doing much damage in this county. The next year, the wheat-midge first reached our neighborhood, and has annually increased its ravages until 1848, since which time it appears to have decreased, owing, doubtless, to the decrease of wheat fields. Before the appearance of the midge, we usually sowed "Red-chaffbald" wheat, which yielded well, and was quite a favorite. But such were the ravages of the fly that we were compelled to give up this variety, and have recourse to the "Mediterranean," "Canada flint," and other new and early kinds, which are still grown to a small extent, but are not entirely proof against the midge.

Of spring wheats, the "Red-chaff bearded," or "Black Sea," had been extensively introduced, and is now raised with good success. It is sown about five pecks to the acre, and weighs from sixty to sixty-four pounds to the bushel, and has never been affected by rust. It yields well, and makes

good flour. The following statement of the cost of cultivation per acre is about the average of this county:—

Spring Wheat.

Dr.		Cr.	
To Interest on $20—1 acre—1 year,	$1 40	By 15 bushels wheat, at 87½ cents	
" Ploughing,	1 00	per bushel,	$13 13
" Dragging,	30		
" Seed and Sowing 1½ bushels,	1 38	Deduct cost of raising,	5 63
" Dragging in,	30		
" Harvesting, &c.	1 25	Profit,	$7 50
(Straw pays for threshing.)			
	$5 63	Cost per bushel about 38 cents.	

Oats.—This grain has always been an important crop in this county. Average yield, thirty to forty bushels per acre, and weighing from thirty to thirty-seven pounds to the bushel. The standard weight is thirty-two pounds. Among the best varieties that I have tried are the "Yellow mane oats," which for yield and weight of grain are unsurpassed. In this county, fully as much and perhaps more land is devoted to the culture of this crop now than was in years past. As feed, compared with corn, it is generally believed that two bushels of oats are equal to sixty-eight pounds of corn and cob meal ground together; and when oats are scarce and high, corn is often substituted as feed for horses, in the above proportion.—The following is my estimate of the cost of cultivation:—

Oats.

Dr.		Cr.	
Interest on $20—1 year,	$1 40	By 35 bushels per acre at 25 cts. per	
Ploughing, 1 acre,	1 00	bushel,	$8 75
Dragging the same,	30		
3 bushels seed, 25c, sowing 12½c.	88	Deduct cost of raising,	4 88
Dragging in,	30		
Harvest and drawing,	1 00	Profit,	$3 87
(Straw pays for threshing.)			
	$4 88	Cost per bushel about 14 cents.	

Rye.—This has become a favorite crop in this county since the midge has rendered the cultivation of wheat so uncertain. The yield per acre ranges from fifteen to twenty-five bushels. It is usually sown after peas or barley, from 1st September to 15th October, at the rate of one and a half bushels per acre. It is to a certain extent used for bread, among the German settlers here, but the greater part is sold for distilling.

Rye.

Dr.		Cr.	
Interest on $20—1 year,	$1 40	By 20 bushels per acre at 50 cents	
Ploughing 1 acre,	1 00	per bushel,	$10 00
Dragging, do.	30	Deduct cost of raising,	5 13
Seed, 1½ bushels, and sowing,	88		
Harvesting,	1 25	Profit,	4 87
(Straw pays for threshing.)			
	$5 13	Cost per bushel about 25 cts.	

Corn.—The varieties most esteemed in this vicinity are the "yellow eight-rowed," and the "white eight-rowed." The ears of these kinds are about eleven to twelve inches long, the cobs small, and the kernels large and heavy. The latter variety, though earlier to ripen, is not as extensively raised as the yellow, because it does not sell as well in market. It makes, however, a beautiful white and sweet meal, which, when mixed with one-third wheat flour, forms a very palatable bread. Both the above varieties are

preferred because they ripen earlier than any other kinds, and the cob dries quicker. They are very prolific, having usually two or three ears on each stalk, if grown on well-prepared land, and from seed well selected. Too great care cannot be taken in selecting and preserving the seed. I consider this the most profitable crop raised on a farm; but corn likes *fair play*, and, as the common saying is, "if you cheat it, depend upon it, it will cheat you." The common yield is from twenty-five to forty bushels per acre. The fodder or stalks, when well cured, are as good as hay, weight for weight. Cows will give more and better milk when fed on them; but cattle will usually stand severe cold better on hay. As to feeding grain, I think that if cooked it will do as well whole as ground, excepting perhaps barley, which I prefer to have crushed or ground. Cooking adds nearly one-half the value of raw grain.

Corn.

Dr.		Cr.	
Interest on $20—1 year	$1 40	By 30 bushels per acre, at 50 cents per bushel,	$15 00
Ploughing 1 acre,	1 00		
Dragging, do.	30		
Planting and seed,	75	Fodder per acre,	2 00
Hoeing twice,	2 00		
Harrowing and cutting fodder,	50		17 00
Husking and threshing,	2 00	Deduct cost of raising,	7 95
	$7 95	Profit,	9 05

Peas.—This crop stands next to corn as food for hogs. It is also an improver of the soil, and leaves the ground light and mellow, so that with one ploughing wheat and rye do well after peas. The most esteemed varieties are the "marrowfat," the "branch pea," and the "golden-vine pea." The haulm or vines are not much relished as fodder, except by sheep and young horses, and they merely pick off the empty pods and leave most of the vines. The average product per acre is from twenty-five to thirty-five bushels, and the price from forty to fifty cents per bushel.

Butter and Cheese.—The dairy business has been increasing in this county since 1840, and butter and cheese are the most profitable and reliable products of the farm. The average annual produce per cow is from one hundred and twenty-five to one hundred and fifty pounds of butter, and from three to four hundred pounds of cheese. With twenty-six cows, mostly of native breed, there was made on my farm, during the past year, from the first of April to twelfth December, thirty-eight hundred pounds of butter, which was sold on the farm at fifteen cents per pound. I could have a spring-house, or a lasting spring of water brought through the cellar; but from experience, we prefer a cool, dry and clean cellar. It produces the sweetest cream and the best butter.

Horned Cattle.—This county raises much fine young stock. Average price at three years old, fifteen dollars; cost of keeping, at least five dollars per year; this is not remunerating; and the consequence is that more heifers are now raised than steers. Heifers at two and three years old begin to pay for their keeping, and when they prove inferior cows, are turned off in the fall at ten or twelve dollars, according to size and age, and driven to Albany, Boston, or New York markets.

Sheep.—The low price of wool and the profits of dairy husbandry have done away with most of our sheep farms, where practicable, and the number of sheep in this county must have fallen off very much since the last census in 1845. The average weight of fleece is from three to four pounds, native and mixed breeds. Our wool is sold in the county to be sent to eastern markets, except what is worked up in families or factories among us. Average price from twenty to thirty cents per pound, according to quality. The cost of keeping sheep per head cannot be much less than seventy-five cents or one dollar per year.

Labor.—The usual price of hired hands on farms is from ten to fifteen dollars per month, with board, which is worth one dollar twenty-five per week. In haying, we pay from seventy-five cents to one dollar per day; and in harvest for cradling, one dollar or one and a half per day, with board.

In conclusion, I would say that Jefferson county bids fair to stand foremost among the most productive and the richest counties in the State. We have one hundred and forty miles of plank roads either built or in the process of building, running in every direction through the county. These have been built entirely by the enterprise of our own citizens; and when we add to these another great improvement in communication, which is now in a fair way to be soon completed, the "Rome and St. Vincent railroad," the stock of which was principally subscribed for by the farmers and wealthy citizens of this county, can it be denied that Jefferson county should have the best market in the State. To crown these efforts of enterprise, a better spirit is coming over the farmers of our section; they all seem eager for improvement, and are vying with each other who shall do most to promote the great interests of agriculture and contribute to the welfare of the country. They begin to see that something can be learned from books as well as from practice. The agricultural papers circulating all over the land are doing much to bring about this change, and to persuade farmers that the old system of skinning the land should be abandoned, as degrading and destructive to their own best interests.

The inventive genius of mechanics, by improving the various implements of husbandry, has done much for the tillers of the soil. Their newly invented horse-powers, their threshers and separators, their seed-sowers and grain-crushers, and other valuable machines, do much to expedite the labors of the farm; and the time is fast approaching when the husbandman will have more leisure for mental cultivation, and the science of farming will be much better understood than it now is. The products of the land, instead of being lessened under an improved system of tillage, will constantly be increased, and the tiller of the soil, fully satisfied with his vocation, will bless Providence that made him a farmer.

Respectfully your obedient servant,

JOHN N. ROTTIERS.

Hon. Thomas Ewbank,
Commissioner of Patents.

Newton, Sussex Co., N. J., *January*, 1850.

Sir:—I am sorry to say that none of the inquiries contained in the circular of the Patent Office, soliciting agricultural statistics, can be answered with an exactness which would make them valuable. The nearest I could approach would be an opinion, and that must be based upon the statements of farmers from different sections. The estimates made by them of their crops is not by actual measurement, but by crude guessing. Therefore certain and reliable facts cannot be given.

Pork and butter are the principal products of this county, and are sold in the New York city market. Formerly grain was the main staple, but for a number of years the former business has been steadily increasing, and now has the ascendency. At this time there is not sufficient wheat grown for home consumption; while in former years there was always a surplus. One reason for abandoning the wheat crop, is the exhausted state of the soils, which will no longer remunerate the farmer for his time and labor, when applied to that particular branch.

No effort is made to restore the land to its original fertility, because none take the trouble to ascertain the causes and apply the remedy. The pork is mostly made from the refuse milk of the dairies, and corn; but the corn is not generally used until the feeding on milk has ceased. Hence the corn crop is an important one, and much attention is given to its culture. The crop of 1849 is greater than any ever before raised in this county. The increase is not in the number of acres planted, but in the produce per acre; and is to be attributed entirely to the favorable season. From some experiments made during the fall, I am strongly inclined to give the preference to the eight-rowed yellow variety, and shall be particular another season not to plant any other kind. Many observing farmers have given their opinion in favor of this variety, but without any data upon which to base the preference.

In intrinsic value for feeding, I think there is a difference of twenty-five per cent. in favor of the yellow corn.

The *potato* crop is not as large as in past years, in consequence of the disease having deterred farmers from planting their usual quantity. The disease in the last crop assumed a different form, and is less destructive. It is now called the "dry rot," and does not produce the rapid decay and fetid smell characterizing the disease in its original form.

In 1848, I planted potatoes on a clay loam, and in each hill I put one gill of air-slaked lime. Did not use any other manure, except once I put on some gypsum; otherwise the cultivation was that usually given to such crops. Suspecting from the observations of former years that the fall rains had much to do with the disease, I concluded to gather the crop early, which I did the last of August and first of September. The skin at that time was quite loose, and was much broken by handling. I housed them where there was a good circulation of air, and did not disturb them until they were stored in the cellar for winter. There was no appearance of rot among them, and they kept well until July, 1849. May 11th, 1849, I planted potatoes on corn stubble, and used no manure or lime. May 23d, planted again in another part of the same field. June 8th, planted another lot on grass sod, without manure. All had the usual mode of cultivation. In August I commenced digging those planted first, and no disease was then discovered, and they still remain healthy. The later planting was left until the last of September, and a part were secured before the fall rains began. These were free from rot, and have continued so. Those which were in the ground during the rains showed marks of disease when dug, and the supposed sound ones were carefully separated, and kept by themselves in a cool and airy shed, and left undisturbed for some weeks, when they were examined, and perhaps one-third were found to be affected with the dry rot. These were picked out, and the selected good ones were sprinkled with lime, and put away in the cellar. Subsequent examination showed but little further progress in the disease, and some potatoes were found thoroughly diseased at one end, and perfectly sound at the other. The only way to account for this is the use of the lime. The effect seemed to be to check the disease even after it had made some progress. I have been informed of instances where the effect was similar, but the lime was sprinkled on the potatoes when they were first taken from the field.

It will be observed that in the instances when the potatoes were dug before the rains, they escaped the disease; and I am satisfied that early planting and gathering are as sure preventives as are yet known, and that gravelly knolls have the preference over any other situations.

The system of farming here is the same as that generally pursued throughout the whole country, and what is known as the *old system*. No improvements of modern times have been introduced, except in a few isolated cases. But a spirit of inquiry has been aroused, and in almost every neighborhood some enterprising individual is eagerly seeking knowledge and information as to the improved methods of farming.

Through the persuasions of the editor of "The Working Farmer," I was induced to try the effect of subsoiling my corn ground, and the results have been beyond my highest expectations. In short, the crop was double any other which had been gathered from the same land. I cannot do otherwise than speak most encouragingly of the use of the sub-soil plough, and my wish is that one was in the hands of every farmer in the country. So much has been written on the subject, that the philosophy of its operations, and the many advantages to be derived from its use, need not here be repeated.

Very respectfully yours, &c.,

CHARLES M. HALSTED.

New Castle Co., Delaware, *February 4th*, 1850.

Sir:—In reply to the questions of your circular, I present the following:

Wheat.—Two varieties are sown in this county; the "Mediterranean" and the "Stewart white;" the old "red beard" is sown but little. The Mediterranean is more generally sown than the white, and is perhaps five to eight days earlier. Weight sixty pounds.

The fly attacks both varieties, and last year's crop was probably one-fourth short on that account.

The early-sowed was, in this vicinity, very much injured, while that sown after the drouth (middle of September) suffered but little. Some good crops were made, but they were exceptions. The rust attacks the white wheat—the Mediterranean is free from it. Time of sowing, from September 1st to 25th. Quantity of seed from one and a quarter to two bushels per acre; harvested from June 18th to July 5th. Price, one dollar and five cents for red, and one dollar and ten cents for white.

Wheat follows oats, or is sown on clover sod; each has its advocates, and some farmers try both. Others again, sow in the corn, substituting wheat for oats. The soil best adapted to its culture is one of medium clayness. Our soil in Delaware varies from the stiffest clay to the light drifting sand. Wheat is found in perfection about the middle of New Castle county, although fine crops are raised from the northern line, among the hilly hundreds, throughout New Castle and a part of Kent. The yield varies from eight to forty bushels per acre—a wide range. On *unimproved* worn-out lands (and these are becoming rarer every year, under the influence which an enlightened agriculture exerts), the yield is about the seed, or but little

more. The first lift from the helping hand of lime or marl will give six to ten bushels; and once on its feet, the long abused soil rapidly advance in strength until it will give, in the regular rotation, 25, 30, 35, 40, and even 45 bushels per acre. The average yield of improved lands in New Castle is about 20 bushels, and a much higher rate is easily attained. The aggregate of the crop I know not, but the census will show this, and the aggregates of other products, which it is impossible for an unofficial man to give, except by estimate, which is always vague—frequently wild. Basing, however, an estimate on the Reports for 1847 and '48, and comparing the crop of 1849, the number of bushels will not vary much from 475,000. Cost of production I estimate as follows:—

Ploughing clover sod,	$1 00
Harrowing,	20
Sowing,	05
Cradling, binding, &c.,	1 00
Threshing,	2 00
Seed, 1½ bushels at $1 10,	1 65
Hauling,	40
Interest on $80, 6 per cent.,	4 80
	$11 10
Deduct 1 ton straw,	3 00
	8 10
Cost per bushel,	40½
On stubble we may add one-fifth of 20 loads manure at 50 cents per load,	2 00
Cost of 20 bushels,	$10 10
Cost per bushel,	50½

Oats.—One variety is universally used—the common oat. I have tried the imported "Irish," but it degenerated the first season, and presents no advantage that I know over the common kind. The "black," and the "barley" oats are sown by some few. The Irish ripened about ten days later than the common. I cut it on the 26th of July; the common was cut from the 15th to the 21st. Quantity of seed, from 2 to 3 bushels per acre. It is sown from March 20th to April 8th. Price, 28 to 31 cents. The value of oats as feed for horses is about half that of corn. Its culture is becoming unpopular; it has not paid enough profit, and many are endeavoring to substitute corn or wheat in rotation.

The yield varies with the season, and of course with the quality of the land. For the last two or three years, the crops have been poor, from 20 to 30 bushels per acre; good land, in good seasons, should give 40 to 45 bushels.

Estimate of crop, 740,000 bushels.

Estimate of cost;—

Ploughing,	$1 00
Harrowing,	20
Seed, 3 bushels, 30 cents,	90
Harvesting,	1 00
Threshing,	1 00
Hauling,	50
Interest on land,	480
Sowing,	05
	9 45
Deduct 1 ton straw,	3 00
	6 45
Estimating crop at 40 bushels per acre, cost per bushel,	16⅛
" " 75 " " " "	25⅛

Rye.—But little sown; many farmers sow from ¼ to ½ of an acre for the straw—principally for home use. Straw will average $10 per ton, or $6 per 100 bundles. The seed does not appear to fill well, but I know of no defect in the soil which would prevent its culture.

Barley.—Little sown. In the lower parts of the county, fine crops have been raised; when the land is in good heart, it will produce forty to fifty bushels.

Corn.—Of this, the most important of our field crops, we have many varieties, and everybody esteems his own kind the best. The grain varies from pure "flint" to pure "gourd-seed"—of course the mixtures which are between these two varieties are most common—it inclines more to gourd-seed than to flint. Flint weighs full standard fifty-six, the gourd-seed from forty-nine to fifty-two pounds, and the mixtures range between. I omitted to mention that the standard weight of wheat is sixty pounds. The standards are fixed by law. Oats are sold by measure. Flint ripens from ten days to two weeks earlier. It will not produce as many pounds per acre as the lighter gourd-seed. Soil exerts its influence over the character of corn, a heavy soil tending to produce flint—light soil, gourd-seed.

The corn is "cut up" in the fall, and after curing in the shuck, is husked; the shuck remaining on the stalk with the blades.

I am unable to estimate its value, but the entire fodder is worth one-fourth as much as good clover hay; meal is better for feeding than whole corn—except, perhaps, for sheep.

The average yield on improved land is fifty bushels; though crops of one hundred and twelve and one hundred and sixty bushels per acre are *reported* to have been raised in the county, in 1849. *I, however, did not see them.* The yield increases from year to year. A general and rapid improvement of the State is in progress, and in nothing is this seen more clearly than in the corn crop. Mossy "old sedge" fields, which have laid out for years, are broken up, and will yield, if it be a good season, from five to ten bushels per acre; fence them, lime them with twenty to thirty bushels, and seed the oat crop with clover, and in two years the clover sod will return eighteen to twenty bushels of corn.—Another dressing of lime, or its equivalent in marl, of which there is an abundance in the lower half of New Castle County, will show thirty bushels corn; and of wheat, if the farm manure be used on it, nine to twelve bushels will not be too much to expect.

Clover and lime will bring up all our "old fields;" these in New Castle County are now a rarity, and the middle section of the State is pursuing the same renovating process with great assiduity and the same success.

I would estimate the aggregate crop of corn at 4,200,000 bushels.

Time of planting, from April 25th to May 10th. Quantity of seed, from 7 to 8 quarts.

The cost of production is as follows:—

Seed	08	Checkering	15
Ploughing	1 00	Planting	19½
Harrowing	20	Working	1 20
Marking	15	Cutting up	37½
Husking	1 12½		
Shelling	50		10 77½
Hauling	1 00	Deduct fodder	1 50
Interest	4 80		
			50)9 27½
		Cost per bushel	18½

Hay.—On upland it is best to sow clover alone, or mixed with timothy, and the yield is about one ton of clover, or one and a half of timothy. Mixed hay is valued as containing the good qualities of both, but from the difference in time of ripening it is difficult to save both in perfection. Timothy is preferred for horses, clover and mixed for stock.

Extensive meadows, or "marshes" as they are termed, are found on the margin of the Delaware river and bay, and their various creeks on the Choptank, and Nanticoke rivers, and numerous branches. This alluvial deposit covers many thousand acres, which are reclaimed from the tide by means of levees of mud, or of mud and stone wall. One or more main drains are made, many lateral ditches and land drains, to carry off the rain and spring water; the marsh is laid down in timothy, and becomes a splendid meadow, from which from one to three tons per acre are cut, heavy cattle are fattened, and where sufficiently high, corn is raised from sixty to ninety bushels per acre.

The marshes of Christiana Creek are worth from one to two hundred dollars per acre. The quantity reclaimed from the water is very large; but immense tracts, facing the middle and lower portions of the State, are yet waste, abiding their time, which at the present rate of progressive improvement is not far distant.

Price of hay for the past year from $11 to $14 per ton.

Potatoes.—The crop of the past year was a very fine one; little or not at all affected by the disease. The Mercer is the favorite for planting; other varieties are "Early White," "Pink Eye," and "Blue Skin." Mercers ranged through the season from 40 cents to $1 12 per bushel. Average yield per acre, one hundred and fifty bushels.

Estimated aggregate crop of potatoes in the State, at one acre to a farmer, and one hundred bushels per acre, 350,000 bushels.

Cost of production.

Seed, 10 bus. @ 75 cents	$7 50
Ploughing	1 00
Planting and spreading manure	3 50
Working	1 75
Digging	3 00
Hauling	3 00
Interest on land	4 80
½ of 20 loads manure	2 50
Cost of 150 bushels	27 05
Cost per bushel	18 cents.

Sweet potatoes are raised only for home consumption; some turnips, a few carrots and beets are raised for stock—I know not what quantity, but it is quite small. Root cultivation has been neglected.

Butter.—The quantity made is very great. Baltimore, Philadelphia, and Wilmington being the markets. Dairies of from 15 to 100 cows are common through New Castle county. First class cows in dairies yield in the first six months 144 lbs.; in the next three months 36 lbs.=180 lbs. @ 20 cts.=$36.00. Second class cows in the first 6 months 80 lbs.—next three months 20 lbs.=100 lbs. @ 20 cts. $20.00. Four dairies in one family, of Red-Lion Hundred, send 1,000 lbs. per week to Baltimore, from 200 cows, for 6 months.

Butter is worth from 14 to 28 cents; averaging above 20 cents.

Well-ventilated cellars are preferred for butter purposes. Cream for ices finds a large and profitable market in the cities.

Cheese.—Little or none made in the State.

Horses.—Horse-breeding for export not attended to largely. Western horses are brought in and disposed of in the State, while at the same time many fine animals are driven out to the cities.

Stock generally of good quality; and the number keeps pace with the increasing population.

Mules come under the same category; of both horses and mules, more come in than go out; for the increase in the number of farms, and their quality, demand annually a large increase in number of these animals. Mules are preferred, where steady work is required; such as hauling. Their price is from $175 to $225 per pair. Horses (farm) range from $40 to $80; average $50 each.

Horned Cattle.—Large numbers of home-raised and drove cattle are fattened every year for the northern markets. Their value may be stated at an average of $20 for steers, and $40 when fat. Cows, dry, $12 to $20. Beef $5 to $6 50 per cwt. Wilmington and Philadelphia are the markets. The Devons are becoming a favorite stock.

Sheep.—The varieties generally found are crosses of the merino and common country sheep. In the lower part of the State the common breed prevails; in the remainder, half and quarter merino. In this county, the highly improved Leicesters and Oxfordshires are found in perfection; finer specimens, or flocks, are not to be found in the United States.

The Messrs. Reybold have expended much care and a large outlay in introducing the finest specimens, having personally selected them from the English flocks; their sheep weigh, when dressed, from 150 to 180 pounds. January 31st, Mr. J. C. Clark sold a three-year old wether for sixteen

dollars, which weighed over 150 pounds, and in two or three months more would in all probability reach 185 or 190 pounds. The clip of the Leicesters will range from six to seven pounds, value 25 to 30 cents per pound. The half merinos clip about three and a half pounds, at about the same rate. The common coarse wooled about four pounds, at 20 to 25 cents per pound. The wool sold in Philadelphia. The cost of keeping will not be far from $1 50 per head.

Cost of half-blood ewe,	$2 00	Value of fleece,	$1 00
" to keep "	1 50	" lamb,	2 25
		" ewe, fat,	2 75
	$3 50		
Profit per head, $2 50			$6 00

Eight sheep can be kept where one bullock can be fed. The Leicesters and Oxfordshires, of course, require more room and more feed. To fatten these, one bushel of corn per month is sufficient, and two or three will make them fine for slaughtering. Many sheep are killed by dogs, but I cannot ascertain the number.

Hogs.—The ordinary age at killing is from fourteen to sixteen months, and average weight 300 pounds. It is difficult to state the cost of the pork, but perhaps four cents per pound is the lowest figure. Few farmers keep more than they can "slop," and these require about 4 bushels corn per 100 lbs., to fatten them.

Temperature.—The thermometer on the 21st June, 1849, stood at $101\frac{1}{2}$° in the shade, northwest exposure. January 11th, 2° above zero.

The mean temperature of the year was $51\frac{7}{18}$°, at 8 A.M. $48\frac{1}{6}$°, at 2 P.M. $59\frac{1}{4}$°, at sundown $51\frac{1}{4}$°.

Labor.—With board 50 cents per day, $8 to $12 per month; without board 75 cents per day, $14 to $20 per month. Harvest ranges from $1 to $1 50 per day. Board from $6 50 to $7 50 per month.

Plaster is much used on clover; it is applied at the rate of one bushel per acre, and frequently doubles the crop, always improving it. It is sown also on wheat.

Guano is imported largely. Hundreds of tons are used in corn and wheat. The best method is thought to be to plough in about three hundred pounds per acre. On the best land the benefit from it is not so great comparatively as on thin soils. In the lower sections, good crops, say twenty or thirty bushels corn, are raised with it, when not more than eight or ten could be obtained without it.

Marl is extensively applied in the rural districts. There are two kinds: the "shell," and the "greensand," containing from 20 to 58 per cent. of carbonate of lime, and from 26 to 33 per cent. of the greensand, which latter contains 5 to 10 per cent. of potash. From 250 to 500 bushels are spread either on the clover sod or on the ploughed corn ground. Many old farms have been resuscitated by this fertilizer.

Poudrette is used by some few, who put about three bushels per acre on corn, applying it in the hill. They think it pays them a profit. The value of manure is at a high point in our estimation, and increasing attention is paid to the subject.

Lime.—This is the great fertilizer and improver. It is brought within the reach of every farmer in the State, by means of the canal, railroads and numerous navigable streams. Its cost varies from 13 to 15 cents per bushel on the shore, and from $\frac{1}{2}$ to 2 cents more places it on the farm ready for slaking and spreading. From 25 to 40 bushels per acre is the ordinary dose, and it is applied generally before the corn crop, once in each rotation—the common rotation being corn, oats, wheat, clover, pasture.

Orchards.—General attention is being turned towards the renewal of the fruit orchards, which had degenerated, and in many places died out as the land was impoverished. The peach orchards form a very important branch of industry and profit. Thousands of acres are devoted to the growing of the peach, which finds its market in Philadelphia, New York, Boston and Albany. The ground should be well prepared and in good heart, ploughed and harrowed thoroughly, and the trees two years old from the stone planted about 18 feet apart each way, giving about 125 to an acre. The orchard yields a full crop the third year, though there may be a half crop the second season. The orchards last in full bearing from ten to twelve years, and when cut down furnish a large amount of fuel, equal in value, when seasoned, to hickory wood. The produce varies very much; in a fair bearing year, the trees will average five baskets of $\frac{3}{4}$ of a bushel each. In 1849, there was almost a total failure, many orchards entirely without fruit—indeed all kinds of fruit failed; the cherries were diminished in number, and inferior in quality. The peach orchards which bore were richly remunerative, although they averaged not more than one-fifth of a basket per tree. Price, last year, $1 50 to $3 per basket. In full seasons, the price in Philadelphia varies from five to fifty cents, out of which the cost of picking, sorting, hauling, freight and commission on selling is to be paid, amounting from nine to fifteen cents per basket; to which add loss on baskets not returned, at least ten per cent., say three cents. Peach-growing is still increasing—new orchards are set out every season to meet the increasing demand. Land is, of course, rising rapidly in value. Improved property in New Castle county, according to its situation from market, will average from $65 to $100 per acre. Much of it in the middle and upper portions of the county is worth over $90. A farm of twenty acres, within two miles of Wilmington, buildings valued at $600, was sold in December at $300 per acre, $6,000. Unimproved, or but partially improved land ranges from $50 down to $10 per acre.

I remain,

Yours respectfully,

ALLEN VOORHEES LESLEY, M. D.

Hon. Thomas Ewbank,

Commissioner of Patents.

Lima, Delaware Co., Pa., *December* 3d, 1849.

Sir:—A copy of your circular dated July 1849, desiring information from "Planters, Farmers, and others on subjects connected with Agriculture," was received by the Delaware County Institute of Science, from the Hon. John Freedley, and the undersigned were directed to furnish replies.

The detailed report of our institution on the condition of the agricultural interest in this and the adjoining counties for the last year, published entire in the Patent Office Report for 1848 (page 436 to 454), to which you are respectfully referred, embraces a full, and it is believed, a correct view of the then and present *general* condition of that interest in this portion of the State; leaving little to be said at present beyond direct replies to your enumerated "points," and the accidental variations from season, &c. The absence of any legal provision in our State for obtaining precise statistical

information serviceable to you, necessarily renders our opinions and estimates somewhat uncertain, and confined to our local observation and experience, applicable with some degree of strictness to the counties of Delaware, Chester, Montgomery, Philadelphia, and Bucks. Under these conditions, we respectfully submit the following remarks to the queries in the order they stand in your circular.

Wheat.—Spring wheat has no place in our system of cropping; occasional experiments have uniformly resulted in failure, and no reliance whatever is placed upon it. A few samples received from the Patent Office, procured in Syria by Lieutenant Lynch, were experimented upon by a member of this institution with the usual result. Of winter wheat we have three varieties in use; the "red chaff bearded," which has maintained its popularity unimpaired for nearly half a century until recently, is yet preferred by many of our farmers for its exemption in a good degree from mildew and rust,* the stiffness of its straw, and for admitting of late sowing to avoid the fly, or when convenience renders it expedient. It is supposed to constitute less than a sixth part of our present wheat crop. The "Mediterranean," introduced in 1836, rose at once to general favor, and continues to be largely cultivated. Its exemption from the attacks of the fly on its first appearance, and its maturing the grain some ten days earlier than other varieties, were valuable properties; the latter of which it still retains, greatly lessening the chance of injury from mildew. The "Mountain," or "Steward" (regarded as the same variety), a white beardless wheat, introduced in 1846, early attracted public attention. The crop of 1848 was very productive, and it promised fair to drive others from cultivation, but on more general trial, it has not met the favorable anticipations formed of it, and it is believed that less of it has been sown the present than last year. Liability to rust, late ripening, small grain, and the comparatively light yield this year compared with last, are the objections. There are a few other varieties cultivated in this district to a small extent, mainly in the course of experiment. The average time of ripening is from the 6th to the 10th July, except the Mediterranean, which is nearly ten days earlier. The standard legal weight per bushel in Pennsylvania is 60 pounds; all our varieties will in ordinary years reach an average of 62 pounds. The "enemies and diseases" are the Hessian fly in autumn and spring, and rust and mildew occurring about the last of June. For the former, *late sowing* was resorted to (after the first frosts), but the plant necessarily remaining weak, suffered by the severe winter, and almost certainly by the fly in the following spring. Early sowing (10th to 20th September) has proved more successful, particularly when highly manured; the plant having produced strong roots is in condition to force itself forward, and in a great degree overcome the wounds inflicted by the fly. The heaviest crop is almost uniformly the result of early sowing. Our soil consists mainly of primitive formation of rock of various classes, nearly all of which are friendly to wheat, and will produce (within certain limits) in proportion to the state of the season. The quantity of stable manure usually applied at the time of seeding is from twenty to forty loads to the acre, and the best results have been observed when the manure remained *near or at the surface*. Leached ashes, hen-house and hog-pen refuse are very valuable fertilizers; for all which *guano* has been extensively substituted the last year, at the rate of two

* *Rust,* in the sense here applied, is restricted to injury to the straw, not to the grain.

to three hundred pounds per acre, with effect fully equal to the above quantity of stable manure, and its use is increasing. Soil constituted largely of clay is esteemed most favorable for the wheat crop, if the quantity of rain at the growing season be under the average and the temperature favorable; and *vice versâ.* Under our system of cultivation, wheat is the crop to which manures are most extensively applied, and it is rarely grown without it. The crop throughout the counties above named was very heavy in straw the present year, and in grain (not yet threshed) it is estimated equal to that of 1848, viz., 20 twenty bushels per acre, and 160,000 in this county. The cost of production, as furnished last year in detail, is $1 02 per bushel, or $26 46 per acre, after deducting $7 per ton for the straw.

Oats.—Several varieties of this grain have been cultivated within the last fifteen years. A white variety, long grown almost exclusively, and still to some extent, together with the common "black oats," are general favorites, yielding profitable crops, and weighing about 33 pounds to the bushel. They are sown from the 20th of March to the 20th of April, or later if convenient; and ripen from the 15th to the 30th of July. The crop the present year is very large, estimated to be an average of 40 bushels per acre, being an increase of ten per cent. on the crop of 1848, and making an aggregate of 272,000 bushels in Delaware county. The cost of raising is about 18 cents per bushel, and their market value at present 33 cents. Oats are extensively cultivated throughout Eastern Pennsylvania as a convenient crop on land growing corn the preceding year, previously to laying down with wheat and grass. It is deemed very exhausting to the soil, and would be generally abandoned, if any other profitable crop could be conveniently substituted, or if Indian corn could be removed sufficiently early from the field to admit of timely preparation for the wheat crop. Any of our varieties of soil *without manure* will produce a fair crop of oats, if the season is suitable; too much rain produces a heavy crop on strong land which often falls and perishes. Nearly the whole crop is fed to horses, cattle and hogs in the neighborhood; to the two latter, ground and mixed with an equal quantity of corn. Their average saleable value is about two-thirds that of corn, the best means of ascertaining their relative value as food.

Rye.—Until the last fifteen years this crop has been extensively cultivated in Eastern Pennsylvania. Previous to that time farmers generally cultivated a greater breadth of land in grain than they could procure manure to cover for wheat; the excess was usually sown with rye as most profitable. This state of things has been changed through the assistance of lime, &c. Each farm will now furnish stable manure to cover all the land which it is the interest of the owner to break up, and rye would of course, under these circumstances, be dispensed with. But about the time named, it was attacked by rust on the straw after shooting the heads, almost entirely blasting the grain, and causing much of the straw to perish and fall. Very little has since been grown, but a few parcels are occasionally observed, which appear to do well, particularly on serpentine soil, where it would appear to be nearly exempt from the disease. Many farmers attribute the failure to the application of lime to the soil, so extensively practiced of late; but it is a question of no practical importance in this vicinity at present, for the reasons given.

Barley, previously to 1818, was extensively cultivated in this section of the State, and consumed by neighboring brewers. The value at that time averaging about one dollar per bushel, rendered its cultivation more profit-

able on strong land than oats, as a crop intermediate between corn and wheat. The subsequent diminished value of barley has reversed this condition, and it is now almost entirely banished from our cultivated fields. The samples procured by Lieutenant Lynch in Syria, and received through the Patent Office, were tried with rather discouraging results.

Corn.—Under our system of cropping (corn, oats, wheat, and grass), this is by far the most important and profitable. Fresh-broken sod ground is usually appropriated to its culture, and will produce from twenty-five to seventy-five bushels per acre, as the soil and season is more or less favorable. Different varieties are frequently introduced, but all are found to assume, to a certain extent, a common character after a few years' cultivation. No new variety is known to have suffered deterioration in valuable qualities; on the contrary, many kinds have been greatly improved from being cultivated here.

The writer received from a friend in 1838 a few ears cultivated by him for the purpose of replanting any portion of his regular crop which might fail, as it arrived at maturity as early, though planted four or five weeks later than the ordinary varieties. Its continued cultivation up to the present time for the same purpose, with and near other kinds, has resulted in a marked improvement in the quantity produced, and in the character of the ear and grain, while it still retains unimpaired the valuable property of maturing early.

A sample of the *Lloyd Corn* was received by our Institution from the Patent Office in 1845, and submitted for experiment to the writer, and it has since been grown in larger quantities. Fears were entertained that our seasons (lat. 40°) would be found too short for maturing the grain, but they proved groundless. By planting not later than the 26th of April, no instance has occurred of its failing to ripen thoroughly previous to frosts. In the size and length of the ear, and also in the time of maturing the grain, a considerable improvement has been observed; while it still retains its pure white grain and prolific qualities, producing generally two or more fair ears on each stalk. It is less liable to be injured by the drouth than other kinds, and for this reason is often planted on the most exposed and poorest situations in the field, with highly satisfactory results. The present year's crop of corn in the counties before named is very large, owing to the highly favorable season. The average is estimated at forty-five bushels per acre. The large quantity of rain in August retarded the process of ripening, while it added greatly to the quantity of grain. Ample time, however, was afforded for thoroughly maturing the grain; and though a severe drouth prevailed in the middle-southern counties which somewhat diminished the product, it is believed that the crop of Eastern Pennsylvania is fully equal to that of 1848.

In your Report for 1848, we perceive that much has been said on the comparative value of corn-stalk and straw fodder as a substitute for hay; and also that a great error is made in estimating the value of the former in this county. In our statement for last year, from which we presume the prices in our county were obtained, the value of corn-stalk and straw fodder was given at five dollars per ton for food, and two dollars for manure: equal to seven dollars per ton, or seven dollars per acre, for all land cultivated in wheat, rye, oats and corn, estimated at twenty-four thousand acres in this county. Our individual experience fully justifies us in the above estimate in this vicinity. By corn-stalk fodder, we would be understood to mean the

stalk with the husk and blade upon it, cut and cured while yet partially green and the ear ripe. Interest and experience have led to the more economical practice of preserving the stalk with the blade and husk upon it, in preference to stripping away the blade and leaving the stalk to perish. Corn fodder in any form is highly relished by all kinds of stock, and its value is fully appreciated here.

No thorough and systematic experiments are known to have been made to determine the comparative value of corn ground or whole as food for stock.

The practice with intelligent farmers is to feed corn *ground* with an equal quantity of oats, mixed with cut-straw to work horses and dairy stock—*corn-meal* to beef cattle, and *whole corn* to hogs under process of fattening. In the latter case, corn and oat-meal mixed and fermented is sometimes used. Partial experiments by the writer justify the belief that corn *boiled whole* to a soft state will greatly expedite the process of fattening hogs—but an equal solidity of the fat is doubtful. Dairying for the Philadelphia market being the leading business in the five counties here especially referred to, the system of cropping is chiefly adapted to that interest. The relative proportion of cultivated fields is steadily increasing. This together with the improved fertility of the soil necessarily produces an increase of grain crops, estimated at five per cent. per annum. This rate of increase will probably be maintained under the operation of these causes for many years to come.

In the absence of positive data, we venture to give the following view of the grain crops of Delaware county, and a comparison with those of last year:—

	Average crop per acre, bushels.	Averaged increase per acre, compared with 1848.	Cost of production per bushel.	Aggregate crop, Delaware county.	Usual weight per bushel.	Legal weight per bushel.
Wheat	20	equal	$1.02	160,000	62 pounds.	60 pounds.
Oats	40	10 per cent.	.18	272,000	33 "	33 "
Corn	45	equal	.20½	405,000	58 "	56 "

Hay.—The crop of hay secured the present year was very large, supposed to average 1¾ tons per acre of clover and timothy mixed, and 1½ tons from natural meadows. Timothy is esteemed the most valuable hay for horses, and clover and timothy mixed in equal quantities for horned cattle. Clover alone is not relished by any description of stock. Natural meadow hay, except from swampy ground, is next in value to mixed timothy and clover, for horned cattle, and is preferred by them to all others if necessarily confined to either. Timothy and clover separately form but a small portion of our hay crop. The former is sometimes seen alone when from frequent cropping the clover has run out, and the latter in fields when the timothy has accidentally miscarried. Timothy seed is usually sown at the rate of four to six quarts per acre with the wheat crop in autumn; and clover in equal quantity in the following March or April, and generally depastured the succeeding year, and cropped for hay the second or third. No new process in curing hay is practiced with us. It may, however, be remarked that within thirty years past a great change in the usual method has occurred. The thorough curing formerly deemed indispensable has been repudiated. The best quality of hay is now secured after one fair day's exposure to the sun, previous to storing.

The eastern counties of Pennsylvania everywhere show the high estima-

tion placed on artificially watered meadows, by our ancestors, before the introduction of artificial grasses. Before the year 1800, these, together with the lands subject to a natural overflow from streams, were their only dependence for hay. Such lands are yet esteemed by many as the most valuable appendage to a farm, producing without manure perennial crops sufficient to enrich and maintain the fertility of a large proportion of upland. In many instances owing to the increasing value of land and greater abundance of fertilizing agents, lands once irrigated as meadows have been brought under cultivation with but doubtful advantage to the owner. The immediate and permanent beneficial effects of irrigation are uniformly observed on any of our varieties of soil, and but for the above reasons it would maintain its original popularity.

Root Crops.—Irish potatoes are cultivated in the counties named, generally in quantities equal to the consumption, and confined almost exclusively to table use. In the vicinity of Philadelphia, much attention is given to raising them for that market. The crop of the present year is larger than usual, estimated at 140 bushels per acre, and 187,600 bushels in Delaware county. Cost of production twenty-six cents per bushel. Owing to early planting the crop was generally ripe and secured before the heavy rains of October, and thus escaped the disease. Those remaining in the ground as late as the 21st of that month, were in many instances attacked, and a large portion destroyed by the rot. Sweet potatoes, turnips, carrots and beets, are cultivated merely as garden vegetables for family use.

Butter.—We have no data for estimating the quantity made in the State. The average product per cow for the present year is estimated at 140 lbs. (being 15 lbs. greater than last), and the whole quantity in Delaware county at 1,190,000 lbs. This estimate per cow is intended to apply to all regular dairies in the five counties before named; where, from the tolerably equal distribution of rain during the past season, a sufficiency of pasture was obtained. Westward of this section, a great scarcity was caused by drouth from May to October.

An opinion formerly prevailed that the comparative excellence of butter produced in the vicinity of Philadelphia, on the western side of the Delaware River, was attributable to the superior quality of the spring water employed in its preparation. Though still generally believed, the result of experiments has led to the belief that the quality of the butter is influenced by the hay, grass or water on which the cattle subsist. Many dairy establishments are now conducted without the use of spring water, in well ventilated milk-houses; and others in spring-houses, where during several of the dry months the water entirely disappears without perceptibly diminishing the quantity or deteriorating the quality of the butter.

The production of cheese is too limited in this section to warrant any reply to your queries.

Horses and Mules.—The value of good farm horses in this section of the State ranges from $75 to $125. About one-half of those in use are raised on our farms; the balance are procured from Ohio, and the western districts. No mules are known to be raised or employed in farming operations.

Horned Cattle.—We have no means of estimating the number in the State. The cattle raised in the counties named consist of a comparatively few from choice stock for the dairies, probably not exceeding one-eighth of the whole number in use; average value at 3 years old, $18. Our chief dependence to keep up the necessary number is on the adjoining counties westward and northward. The number of dairy cows in this small county is about 11,000, and in each of the other four counties a greater number, which require to be renewed about every six years, at an average cost of $22 per head. Our native breeds are generally preferred for their superior dairy qualities, and comprise nine-tenths of the whole. The supplies of working cattle, and stock for fattening, are renewed from Western New York, Virginia and Ohio.

Sheep Husbandry has been abandoned as a business in this section of the State. About 25,000 are annually driven from the western counties of the State into Delaware county, after the wool has been clipped, and are here fattened and slaughtered for our own and Philadelphia consumption.

Hogs, raised on the farm, are generally killed at 15 months old; average weight 250 lbs. net; cost of production estimated at 4 cents per lb., and consumption per head, by our population, about 100 lbs. annually. Small pork, fed on the refuse of dairies, is generally sold at 5 or 6 months old in the Philadelphia market, and will average 80 lbs. each. (See Report for 1848, page 450.)

Plaster and other Fertilizers.—Plaster is extensively applied to crops of clover and other grasses, and to corn—and with highly beneficial results on every variety of soil. Street dirt from Philadelphia, Guano, Poudrette and Bone-dust are considerably used, as assistants or substitutes for stable manure. Guano is becoming popular as a dressing for wheat, turnip and corn ground; and though comparatively expensive, its use is rapidly increasing. But the grand auxiliary fertilizer of our primitive soils has been *Lime.* Nearly all the cultivated land in Eastern Pennsylvania, has been treated once or more with lime, varying from 40 to 100 bushels at each application. Many close observers deem 25 to 40 bushels per acre, repeated every 10 years, the most judicious mode of application.

Orchards, &c.—The diminished demand for cider as a beverage has produced a corresponding diminution in the attention formerly bestowed on the cultivation of apples for that purpose. But those varieties of apples and other fruits suitable for table use have recently become objects of increased interest. The crop of the present year was very light and of inferior quality; owing in part, to the drouth, and also to the depredations of a minute insect which infests the bark, leaves, blossoms and fruits in May, June and July. Peaches, plums, cherries, &c., failed to an unusual extent. Raspberries and strawberries succeeded well, and as a profitable crop probably exceed any other to which the attention of gardeners in the vicinity of Philadelphia has been directed.

Grapes, &c.—The cultivation of grapes, for domestic use, has greatly increased within 20 years past. The Catawba, Isabella and Schuylkill are the favorites, well adapted to our locality, and will, with proper attention, make ample returns for the labor bestowed upon them. The usual mode of propagation is by slips. A much more speedy return of fruit, however, on a small scale, may be secured by transplanting our native *Fox grape-vines* into the desired situation, and the second year, when the frost is leaving the ground in spring, engraft the desired sort upon the stock in the usual manner practiced in nursery grafting. The writer has thus uniformly succeeded in securing early and abundant crops of a quality not inferior to those produced from cuttings. If the season is dry, the roots of the vine

should be protected from the direct action of the sun on the contiguous soil, and the consequent evaporation of the moisture, during the months of July and August.

The above brief notices of the several crops in this vicinity, in reply to the queries proposed in your circular, are respectfully submitted by

Your obedient servants,
JOSEPH EDWARDS,
JOHN MILLER,
Committee of the Delaware County Institute of Science.

Hon. THOMAS EWBANK,
Com. of Patents.

WOODLANDS, MONTGOMERY CO., MARYLAND, *January* 18*th*, 1850.

SIR:—Your circular dated July last only reached me a few days before Christmas; since which time I have not had leisure until now to consider the various subjects of inquiry it embraces.

Approving highly of the object and purposes of those queries, it will afford me pleasure if anything I can communicate in reply to any of them will contribute to so desirable a purpose as you contemplate.

My residence is near the centre of Montgomery county, and the soil, inclining to red, is rather a stiff clay; the country is beautifully undulating, and therefore requires but little ditching, except the bottom lands in particular spots. The high lands are admirably adapted when improved to the growth of wheat, oats, and corn, and are, I think, less injured by an excess of either moist or dry weather than any lands I have ever noticed.

Wheat.—For many years I confined myself to raising the "red chaff bearded" wheat; this kind succeeded better on thin lands than any other variety; but of late years I find the *Zimmerman* and *blue stem* succeed best, particularly when guano has been sown with them. The *loss* from shattering is less in those kinds while cutting, securing, and hauling; which amounts to considerable in a crop of the red bearded wheat, if left until fully ripe. I tried the *Mediterranean* one year, which, from being sown late I presume, proved a failure, and I have never used it since. I rarely or never sow my wheat before the first of October; and since I have adopted late sowing it has never been injured by the Hessian fly, an enemy from which early-sown wheat has received greater injury than from any other. This was particularly the case last year. I saw a number of fields so much injured by these insects that, instead of wheat, from one-third to a half of the products from them was nothing but *cheat*, which I consider a proof of the theory I advanced in my letter to your predecessor, published in his Report for 1848, page 471—that "cheat" is nothing more nor less than *degenerated wheat;* and here permit me to correct an error (in printing I presume), in another letter, page 470. It should be "twelve to fifteen *thousand*" pounds of wool instead of that many *hundred*.

Oats.—I have been in the habit of growing the common white kind, but last year I tried the black variety, which yielded a large crop and proved much heavier than the common white. Considerable quantities of oats are raised in this county, not, I believe, because they are a popular crop, but because they generally succeed better after a crop of corn than any other small grain on our thin lands; and they find a ready sale in the district. Mixed with corn (half and half, or two of oats and one of corn) and chopped, they make a nutritious feed for horses, and have been very much used in this way, since the failure of the common rye.

Rye.—The common kind has been unproductive for many years; the multicole variety however is becoming popular and sought after. I have grown it for several years, sometimes on good and sometimes on thin land; but always with success; the yield, however, pretty much in proportion to quality of the land on which it was grown. One of my neighbors last year reaped from a poor field 160 bushels where 8 bushels had been sown; he had, however, turned under a large dose of guano with the seed; the straw on this field was eight feet and upwards high; my crop averaged from five to six high on thin land, without any kind of manure, notwithstanding it was sown in December, and was scarcely visible before the spring, and then retarded by the drouth.

Barley is not grown in my neighborhood. I sowed some one year, which produced upwards of forty bushels per acre, but from its rapid growth I considered it an exhauster, and never repeated the experiment.

Corn (*Maize*).—I have for the last twenty years planted two kinds—the *white* on my best land and the *yellow flint* on thin land, and during that period there has been no perceptible change in the appearance or general character of either. The *white* was introduced here from Frederick county; the ears are large, the grain broad and deep, and slightly indented.

When ground, the meal is as white as family flour, and is generally preferred for bread—the yellow is, perhaps, heavier and more nutritious, and principally fed to hogs and cattle; some however prefer it for bread.

From my experience, I think nothing but necessity should induce the feeding of corn whole to either horses or cattle; because when so fed a considerable portion escapes mastication, and is evacuated without being digested, and such portion instead of benefiting is injurious to animals. My practice is to crush the corn and cob and grind them together, which saves the animal in a great measure the labor of masticating, and it is consumed with avidity, and he thus receives the full benefit of the corn and of whatever aliment is contained in the cob, which I compute at fully one-third more. The shucks are perhaps something more nutritious than good wheat straw for cattle, which is the only use I have ever made of them. In reply to your *Note,* it would be next to impossible to arrive at the actual cost of producing the above-enumerated grains per acre, because the labor required in cultivating an acre of *good* land is no more than that of an acre of *poor* land, whereas the product from the first is from five to ten times greater than that from the latter.

A spirit of improvement, however, is abroad amongst our people, that promises to render Montgomery one of the most productive (as it is among the most healthy and salubrious) counties in the State. By the aid of a friend on whose information I could rely, and from my own knowledge, we have ascertained that *eight hundred tons* of guano have been purchased and used in this county during the last year, besides other fertilizers to a considerable extent. Large as the amount was, the benefit is only discovered "about in spots." The want of a cash capital only prevents the immediate, I may say, almost *magical* improvement of our soil. I was delighted last summer in meeting wagons returning from town with their guano, some with full loads, others with a few bags; all perhaps bringing according to their means. It is, however, to be regretted that the price of guano continues too high for general use. I consider it the best renovator

that can be applied to our lands in their present condition, particularly that from Peru—its effects are immediate, and by pursuing a proper course, I believe may likewise be rendered durable. I have used it for the last five years with decided advantage, and as the system I have adopted I believe differs from most others, I will give a brief statement of facts by which it may be considered. On the first application of guano it was sown with the wheat in October, and during the following winter clover was also sown on the land—after the harvest, the hogs were turned in to glean the scattering heads for a short time, after which no other hoof was allowed to pass over it. The following spring, plaster was sown on the clover, and the clover was allowed to mature its seed, and then the entire mass of clover and seed was turned under by the plough, and the land again sown with guano and wheat. The second crop of wheat was about seventy per cent. better than the first, and the young clover from the seed ploughed in, beautifully set over the field, thus alternating with clover and wheat. My lands thus treated have certainly increased in product from fifty to one hundred per cent., and only required to be sown with clover seed the first time. Year before last I cut the first crop of clover seed with cradles, taking off only the tops, and suffering the seed on the second crop to mature, which was turned under in fallowing. The seed I obtained was considerably more than I had expected, but the young clover is not so well set as I could wish, owing, perhaps, to the great drouth of last year. The kind of clover originally sown on this field is called the *early red*. For rapid improvement, I prefer what is called *sapling* or late clover, the stems of which grow from three to five feet long, producing a much heavier mass of vegetable matter to be turned under. My calculation is that by pursuing this rotation for a few years, and then treating the land to a suitable quantity of lime, it may be rendered permanently productive without much additional expense.

I will here add an experiment I have been carrying on for the last sixteen or eighteen years, which possibly may be advantageous to those living too remote to procure guano conveniently. A small field of 12 or 15 acres very much exhausted, I sowed the first year in oats and clover, applying a tolerable sprinkling of plaster and ashes at the same time. Both succeeded as well as could be expected—the spring following plaster was sown on the clover, which grew finely, and in the fall it was turned under, *seed and all*, and the land sown with wheat, since which I have sowed it every other year with wheat, the clover always reproduced from the seed turned under. The crops of wheat and clover improved every year, and have been considered very fine for this section. In 1847, however, I found it necessary to put in a cleansing crop in order to destroy some running briers that had encroached upon it, and I therefore had it broken up in May, when the clover had advanced considerably, and planted corn. The corn escaped injury from the wire-worm, that was very destructive to many crops that year, and yielded about an average of 8 barrels per acre, notwithstanding the drouth it had to contend with. The succeeding year it was in oats, and produced a fine crop of clover likewise, from the seed turned under in previous years; the clover was turned under last fall, and the wheat now growing on it is *hard to beat!*

One great advantage I have derived from suffering the clover to remain only one year before being ploughed under, is, that the land thus treated has escaped injury from *blue grass*, which invariably, under the *old system* of permitting clover to remain two years on the ground, became so much intermixed as greatly to injure the wheat crop, and I found it necessary in order to destroy it to work the land in some open crop; thus nullifying, in a great measure, the benefit derived from the clover hay; whereas, by the course I have pursued, a gradual but great improvement has been made, and I believe only now requires a portion of lime to make it permanent.

Very respectfully, &c.,

F. C. CLOPPER.

Hon. Thos. Ewbank,
Commissioner of Patents.

Cumberland County, Va., Farmville P. O., *Nov. 6th*, 1849.

Sir:—During an absence of several days from home, I received from Stony Point Mills (not my Post Office), a package containing five circulars from your office, one of which I retained.

I shall proceed to make out my report, lamenting both my own incompetency to do justice to the matter, and that condition of our agriculture, which might give to a simple statistical account of our doings, without any explanatory statement of our many wants and difficulties and the causes which have produced them, an appearance of the work of a spy upon our leanness. Unaccompanied by such a statement, I could hardly be induced to tell what might operate as a slander on the region of my birth, and on my brethren of the plough, whom in many of the best qualities of humanity I consider as unsurpassed by any people on earth.

In the front rank of our difficulties, I would place the fact, that the locality of our congressional district is in the very heart of the Virginian tobacco region. To the cultivation of this weed may we justly ascribe the wide display, in our lands, of old field pines, broom-straw, poverty-grass, naked galls, and yawning gullies. Our forefathers, finding themselves at too great a distance from market to cultivate any other as a *sale* crop than tobacco, established its production as their chief reliance, and it has been entailed by the strong bonds of national custom on their posterity, who have been hewers of wood and drawers of water to this modern Pharaoh, down to the present day.

It is pleasing to find that there are a few bold-spirited pioneers, who have discovered that they cannot afford to cultivate tobacco, and have successfully resorted to other objects as money crops. They, however, generally live much nearer to market, and enjoy much better means of transportation than the people of this district. A few of us are humbly following their example, but with cautious and trembling steps, along the dark, difficult and untrodden route, uncertain whether by forsaking the beaten road, on which Poverty seems to have hung out a broad sign from her gloomy hostelry, we may not meet a speedier precipitation into ruin. The fact is alarming, that with greatly increased anxiety and exertion among agriculturists, but few of them (in this region) seem to be prospering. Their broad acres, by rapidly successive drafts, with no returns of manure, have been constantly turning to dreary wastes, while the means of manuring even tobacco lots have been steadily diminishing. Moreover, the seasons, for a series of years, have been unpropitious for making good tobacco, and its price has been low. At the same time, gradually increasing luxury and extravagance have introduced a largely augmented amount of foreign merchandise, while the deterioration

of our lands has forced us to rely on the West for most of our pork and much of our beef.

It may be asked, Why do you continue then to cultivate tobacco? It is much easier to ask than to answer questions. A drowning man would never catch at straws, were something more substantial within his reach. We would gladly relinquish the tobacco crop if any other means could be devised of meeting demands upon us. This might be done under either of the following contingencies—could our avenues to market be so improved as to allow articles of less value, in proportion to weight, to be transported profitably, and lime, as a manure, be introduced at remunerative prices, or could numerous towns, villages, and manufactories be established so as to bring a market to our doors.

Another of our difficulties arises from our destitution of lime. I reside on the Appomattox River, the southern boundary of Cumberland county. Within my own knowledge, about twenty tons of guano will be used in this part of the county for the wheat crop this fall. I know not what the James River farmers on the northern boundary will do in this way. I suppose they will raise the amount to much more than double that quantity. I have already heard of more than 100 tons being purchased for Powhatan, the next county below us.

Costly as lime is rendered by the expense of transportation, some few have dealt considerably in that article recently, with strong hopes of bountiful remuneration.

Another obstacle to our agricultural improvement has been that from the days of Patrick Henry and John Randolph, we have been warm politicians. This has greatly interfered with our success as cultivators of the earth. But it is cheering to reflect that although warm partisans we are liberal ones. Being almost equally divided, we contend vigorously, but the warmest friends are frequently found in opposite ranks, and we think each other *fools* in nothing but politics.

Adverting more particularly to the inquiries in your circular, I fear I shall have but a lean account to render.

Wheat.—The favorite varieties of this grain are: 1st. The *Turkey*, called also *Siberian* wheat. A small parcel of this was brought from South Carolina by the late Rev. James Wharey and divided between the late Captain Pemberton and myself. This variety is excellent, weighing remarkably and making superior flour. It is now nearly lost in this neighborhood from admixture and other causes of deterioration. 2d. The *Etrurian*, which I now cultivate, and although much mixed before I procured the seed, I prefer it to any other variety within my reach. It yields a good crop of large grains, which weigh heavily and make first rate flour; ripens next to the varieties of May wheat. 3d. The *North Carolina* wheat. This has recently been introduced. I have not seen any of it, but believe it to be one of the very best varieties. 4th. The *Chilian* wheat, introduced by Dr. Crump of Powhatan, and probably not surpassed by any variety among us. I have not seen it. 5th. The *purple straw*, greatly admired in some neighborhoods; it has not succeeded well in my own. I have seen none of it that I would sow on account of the quantity of spelt intermixed. The grain is small and the accompanying spelt beardless—to me a new variety of this pest. 6th. The *white-bearded* wheat, a valuable kind less liable to total failure than almost any other; not very popular with millers.

Among the enemies and diseases of wheat, there are none that I consider

formidable except spelt, Hessian fly, blank heads and rust. The smut some twenty or thirty years ago was alarming, but I believe it has nearly gone out of fashion, whether from the saline soakings used with subsequent rolling in lime, I know not.

Spelt, but recently a stranger, is becoming entirely too familiar amongst us. I have known several families badly poisoned but not killed, by eating spelted bread. I am endeavoring to exterminate it, and believe I shall succeed by the most searching watchfulness to cleanse my seed, and by early fallowing before the volunteer spelt and other nuisances shall have matured their seeds, then sowing down and raking in the Bass or cow-pea, and refallowing for wheat in the fall.

From one year's experience I trust that my fields will thus be cleansed, that the pea haulm will (as a green crop) be about equal to the *prevented* second crop of clover, and that those of the peas not gathered for seed will greatly assist in preparing hogs for slaughter, or if turned in will serve as a valuable fertilizer.

The Hessian fly is often very destructive, especially to early sown wheat. It seems to be a point almost yielded, that there is no other way of warring against the myriads of these little enemies but by incommoding them as much as practicable with cold weather, by our time of seeding.

The opinion may be ridiculed, but I feel bound to state it, that, in whatever other ways this enemy may be propagated, its egg is deposited in the germ of the grain, and that its ravages may be greatly lessened by dipping the basket of seed in boiling and then in cold water. A running stream is best if convenient. This has been faithfully practiced at my suggestion for thirty years, by a relative of mine in Prince Edward, and though he finds it very troublesome, he persists in it, thinking himself well remunerated.

The same end might probably be attained by thoroughly greasing the seed, and dusting well with flour of sulphur. Two well attested facts came to my knowledge, many years ago, of Hessian fly making its first appearance, in a new region among wheat, the seed of which was brought from places where the insect existed before. I will not, however, undertake to deny that the egg is also often deposited in the young blade.*

Blank or grainless heads are becoming a serious evil in wheat; what produces the malady I know not, unless it arises from a want of that sort of nutriment in the soil which is necessary to the formation of grain; and I look with solicitude to the modern concentrated manures as the remedy. It has certainly been a great evil in our wheat crops for several years.

The rust I feel assured may be greatly obviated by early sowing, and by so shaping and smoothing the beds, and graduating the drains, that there shall be no receptacles in which water may stagnate and putrefy. Our seeding has been so much hindered by drouth in the summer and early fall, and by so much rain of late, that I fear the crop may suffer much from rust. We never before were so late in seeding wheat. It has been the prevailing opinion that red or clay soils are peculiarly suited to the production of wheat.

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* Our correspondent confounds two insects, both flies it is true, but one deposits its eggs in the seed as he suggests, and the other in the sheath of the young wheat.

Of the latter, two generations grow in a year; of the former, only one. The wheat fly, *cecidomya tritici*, attacks the seeds; the Hessian fly ("cecidomya devastator") attacks the stems of the plant near the ground. It is an easy matter to hatch larvæ of both insects, and every wheat-grower should be familiar with their habits and transformations.

But there is a vein of gray land in my neighborhood, usually called the Grimes vein, abounding in felspar and in many places entirely underlaid with that stone. I have never seen wheat of as fair grain raised anywhere else as on this vein, when the season was not too wet. The flour from this wheat has long been celebrated as family flour.

As to manures, it has been too common until recently to apply but little on any crop except tobacco; the consequence has been that the wheat made on other than tobacco lands rarely more than paid the cost of production.

Lately many planters have annually prepared new lots for tobacco, converting the old ones into wheat and clover lands. This has been, so far, introducing the fallow system, and an improvement. The practice of top-dressing wheat lands with the stable manure made in summer has been of late getting more common.

I feel utterly unable to give the statistics of our cropping in this district. The lands are of such varying fertility, and the skill employed in the different localities so variable, that I can form no idea of the average product. The lands on the large rivers Staunton and the James can hardly be excelled, and the agriculture on the latter (so convenient of access to Richmond) is like gardening. I understand, however, that it has become a proverb, "If you want a good dinner go upon the river. If you wish to borrow a hundred dollars go on the poor ridges."

Oats.—I have tried the common black, and the Russian or ruffled oats. Both answer well. The latter grows taller on poor land than the former, and ripens too late to interfere with wheat harvest. It is apt to *tumble* on rich ground, its straw being weak. I prefer the former on the whole. Oats are used largely among us, growing better than any other crop on our thin corn lands. It affords good feed for horses and oxen, and is used with a view of saving Indian corn.

Rye.—A new variety of this grain called the *multicole*, issued originally from the Patent Office, has lately reached my neighborhood from Lynchburg. The crops from which it came were extraordinary. It has been sown by a gentleman near me on trial—as horse feed. Common rye, from what cause I know not, never prospered in this region, and its culture has rarely been attempted.

Barley.—This grain I believe is properly cultivated on the shores of the Chesapeake, for the Baltimore breweries. It is not raised here. I have long thought our light thirsty soil and hot sun admirably adapted to its growth, and that it would make about the best substitute for the exhausting Indian corn crop, if used in feeding stock. The fine horses of Arabia, I believe, get no other grain. I judge that our ignorance of the mode of *hummelling*, I believe it is called, or divesting it of its awn, or beard, has prevented its introduction and use.

Indian Corn.—There are many varieties of this grain raised in our district. The large-grained kinds seem to suit it best. Of these I believe the old-fashioned Tuscarora is the most popular. It is a large, long-eared, white and heavy variety. Some planters mix this with the Dearing variety, which has a multitude of grains on the cob. They plant the latter among the former, in several alternate rows, cutting away its tassels in due time, thus fixing the large-grained kind on the many-grained Dearing cob. My opinion is, that weight in corn is an unimportant consideration. Twice as much of the lightest kind may be raised on the same land as of the heaviest white; it is probable that the amount of nutriment is about equal.

The corn-seller, however, might find it for his interest to cultivate the lightest, as with us all grain is sold by measure, except wheat. Sixty pounds of wheat is the legal bushel. I consider the best corn-blades as superior for age to shucks, hay, or anything I ever tried. I think ground grain better than whole, and cooked better than raw. I have had too little experience in soiling with green corn to give an opinion.

Hay.—This is by no means a grass country, and there are but few meadows. Most of our good managers depend on clover hay for forage, reserving their flat lands for more valuable crops. The *real tobacco growers* keep but little stock, and that in poor condition; relying on corn-tops, shucks, and wheat straw as food.

Those who have meadows manage them with varying skill and success. From one to three tons is the crop. They use herds-grass, and red-top, chiefly mixed with clover. Two varieties of native grass, the Randall and Mountain evergreen, are beginning to attract great attention, particularly among sheep-breeders. Our free-stone water is not well suited to irrigation; it hurries the invasion of broom-straw by souring the land, which without irrigation will run to broom-straw in four or five years. I have frequently thought that we might irrigate to advantage with water percolating through lime, or lime mixed with some renovator containing a goodly portion of phosphates.

Peas.—But few cultivate peas except for human food. The red or Bass and the black cow-pea are most esteemed for field culture. They are exceedingly productive, average crop per acre unknown. Peas have no market price among us, but are freely given from one neighbor to another when used as a family vegetable. The cow-pea for field culture has sold for one dollar per bushel.

Sheep Husbandry.—On this subject we are just beginning to awake. It is mortifying, in so many cases to state what we might do instead of what we have done. But what we might do in sheep husbandry ought to be known. A traveler must have observed but little who has not noticed the remarkably fine appearance of some of our best native flocks. Such observations have induced some most valuable men to remove from New York into middle Virginia, bringing with them large flocks of Saxon-Merinos. There are also some fine specimens of Southdown, Cotswold, and Bakewell sheep in course of rearing amongst us. A few triumphant manifestations of the improved growth of grass upon sheep-walks can be exhibited, showing the mutual dependence of the animal and vegetable kingdoms. The devout farmer loves to witness such wise provisions in the economy of nature. As to sheep killed by dogs in Virginia, the number is incalculable.

Plaster and other Fertilizers.—The quantity of plaster has been regularly but slowly increasing. It acts surprisingly on some soils, especially such as contain felspar and horn-blende. It rarely does good, as far as my observation has reached, on lands which crop out no other rocks than quartz. I consider this a confirmation of Mr. Ruffin's theory, that there is acid in some soils, decomposing the plaster applied, which must be neutralised by lime before the plaster can do good.

Fruits.—I have been informed by old people that frost rarely injured fruit while the country was mainly covered with forest. Much attention was

then paid to orchards, and some of the old trees, bearing fruit of the finest character, are still standing.

In modern times, the crops of fruit are very frequently cut short by frost. A few of the lovers of fruit still attend diligently to fruit trees, and when the season suits, are rewarded by as fine apples, peaches, pears, plums, nectarines and apricots as the world ever saw. Generally, however, this matter is much neglected, even by the greatest lovers of fruit.

Grapes.—The vine does not bloom in this section until the danger of frost has passed, about the middle of May. The flavor and quality of the fruit depend more on soil than any other I have ever cultivated. The same variety is often luscious in one locality, and sour or insipid in another, even where the manuring and treatment are similar.

The best grapes I have ever raised, grew on (naturally) poor chestnut-oak quartz land, with a stiff red clay substratum, and of a very thirsty nature. I have succeeded much better by training them on arbors or scaffolds 8 or 9 feet high, than on espaliers. The grapes on an arbor hang from their weight below the leaves, and enjoy air more freely, and are less accessible to insects and birds. A kind of blight is their principal disease. On close scrutiny, a small speck, sometimes two, may be observed on each grape, which spreads most rapidly until the whole berry gets to an ashy hue, and withers. I think it may be obviated considerably by elevating the beds on which the vines grow above the surrounding levels, and keeping open drains to carry off redundant water. These specks may, however, be the work of insects, whose marauding I have never been able to detect.

For vines, I mix manure from the hen-house with effete lime, old plastering, or ashes. I raise grapes only for table use, but think there can be no doubt but that wine might be profitably made in Virginia, and might constitute one substitute for the tobacco crop. He however who calculates on making general and sudden changes in national pursuits, will be the dupe of something like the multicaulis humbug. It has taken the French people centuries to learn how to make wine and silk, and we could hardly do it *off-hand.*

The foregoing, written at hurried intervals, with many interruptions from other cares, is most respectfully submitted—that it greatly needs condensation, which I have not time to give it, is very manifest and much regretted.

With best wishes for your success in the discharge of the most arduous duties of your high and responsible office,

I am, most respectfully,

Your most obedient,

W. S. MORTON.

Hon. Thos. Ewbank,

Com'r of Patents, Washington, D. C.

Buckingham Co., Virginia, *November* 1849.

Sir:—Your circular reached my residence while I was absent at our different watering-places, and some time being necessary to seek information upon the great variety of topics embraced in the circular, will account for the delay in not responding sooner.

First, of the wheat crop, "time of seeding, harvesting, &c." Our farmers generally cut up and stack their corn from the 15th to the 20th of September, and about the 25th commence seeding wheat; the quantity of seed

being from 4 to 5 pecks per acre upon corn land, and $1\frac{1}{2}$ to 2 bushels upon tobacco land. Our time of harvesting is generally about the 20th June. As to varieties, there is a great diversity of opinion; we have the *mountain purple straw; Mediterranean; Turkey; white* and *red May; New York white flint,* &c. &c. All kinds have their favorers. When one variety fails in bad seasons and rough culture, the farmers are post haste in pursuit of some new kind. I am governed by two considerations only; *early ripening* and a *strong straw* not subject to fall. Wheat is at best a delicate and uncertain crop, subject to two great disasters, *rust* and *mildew;* and also the Hessian fly and china bug. The two last are not by any means as destructive as the former. In favorable seasons I estimate 10 to 15 bushels per acre a good average yield.

The standard weight of wheat is by law 58 lbs. to the bushel, but millers buy at 60 lbs., that being about the average weight of a perfect crop. As to the cost of cultivating an acre of wheat or corn, I would refer you to my communication published in last year's Patent Office Report, where the "printer's devil," or somebody else, has christened me *Charles Taney* instead of *Charles Yancey.*

Oats.—This crop is but little cultivated, there being no market for them except in our villages, in the small way, or from one neighbor to another in barter. Their value is about one-half that of corn. The kinds cultivated are the *black, white, large potato* and the *ruffled;* the latter suits our poor land the best, as they grow six inches taller, but the black oat is generally preferred, being the heaviest. It is not a popular crop, as it brings very little money, and is known to be a great exhauster of the soil.

Maize, or *Indian Corn.*—Varieties, *white* and *yellow gourd-seed, flint,* &c. The white gourd-seed is usually preferred, as it makes the best bread, and is equally productive. Time of ripening is unimportant, as every kind planted in May will ripen before a frost. We consider corn the staff of life, and principal food for man and beast. It makes fat horses, fat bullocks, and fat hogs, and a Virginia housewife would think she had a poor dinner if the table was not graced with a fine ham of bacon. With an ample supply of corn, we are not compelled to peddle in root crops as they have to do in England, and other northern latitudes where they cannot grow corn. This grain will mix as far as the winds blow the pollen or farina from the tassels, which impregnates and produces the corn. The yield per acre on our uplands is not far from 20 bushels, and upon the alluvial bottoms from 30 to 40 bushels. There is no standard weight by law, but 56 lbs. is the general weight per bushel.

"*Corn blades and shucks, compared in value as food for stock.*"—I think good green corn blades, after they have taken a sweat, the best long provender ever given to quadrupeds; they prefer it to any other, and why should they not be the best judges? Corn shucks, packed away when sufficiently moist to produce a little red mildew, and sprinkled over in packing with a sack of salt to the shucks from 100 bbls. of corn, are very valuable for fodder. When used, they should pass through the cutting-box, be made wet and mixed with corn-meal or ground oats; and in this way they are but little inferior to the blades. When the latter are saved, and stacked in the field, as they usually are, I would consider the shucks quite equal to them in nutrition; upon land well prepared, 4 bushels of corn sown to the acre, and harrowed twice to cover deep enough, will make much more fodder for cattle than any meadow. The only difficulty is in curing it, as the

blades cure before the stalks, and if the latter are allowed to grow too large, they are full of sap, and require considerable time to become sufficiently cured to prevent mould. They should, therefore, be cut when about 8 feet high, drawn to the barn, and spread thin to the sun and air.

Peas are cultivated for the table, market, stock, and as a green fallow. The "mountain crowder" and "black-eyed" are the most common varieties. They yield when well saved about ten bushels to the acre; price 75 cents for common kinds—"black-eyed," which are preferred for the navy, $1 per bushel. They fatten all animals readily, and are worth about two-thirds as much as corn for that purpose. To improve the soil, they are sown broadcast upon stubble land after harvest, rolled down with a roller or harrow, and ploughed in.

Some years ago when cotton sold at a high price, it was raised to some extent in the south-eastern section of this State. But little is now raised except for family use. The low price of hemp for many years past has prevented its culture; but my economy is to buy nothing that I can make at home, and I raise hemp for my own use. I sow one bushel of seed on an acre of James River bottom land, which I have done for 36 years in succession without the application of manure of any kind; and I think the yield the present year full as good as the first year of the 36—none is grown for market east of the mountains.

Horses and Mules.—The number reported by the commissioners of the revenue last spring was 316,659—value of farm horses ranges from $60 to $75. Saddle horses, $90 to $100. Our best markets for mules and horses are Lynchburg and Richmond.

Horned Cattle.—By the last census, their number in Virginia was 1,024,148. Sheep, 1,293,772. Swine, 1,992,155. The number of each is at this time much greater. Young stock 3 years old command about $15 per head. Our markets for beef cattle are Lynchburg, Richmond, Norfolk, and the northern cities; and the fattening and driving of cattle to these markets is greatly on the increase. The Durhams, Herefords, and Ayrshires are preferred as beef cattle by the farmers in this section; while the Devons, from their beauty and quick action in the yoke, are highly esteemed as working cattle. They are also good milkers, and I think best adapted to our climate. The cost of keeping until 3 three years old, if pastured on the farm, is not far from $10; but if allowed to range upon waste mountain land, it may be estimated at $5. In neither case to be fed with grain in winter.

Hogs.—No hog designed for slaughter ought to live two winters. At 15 to 18 months old, when fattened, they weigh about 150 pounds. The consumption of a family during the year is about 200 pounds per head, with the usual supply of beef, mutton and milk. To obtain the net from the gross weight, deduct 25 pounds from the first 100 pounds, 12½ pounds from the second, &c. It is difficult to estimate the cost of production per pound, but I judge the average not far from 5 cents.

Plaster and Lime.—Clover is generally seeded upon wheat and oats, and plastered, a bushel to the acre. Its action is extremely beneficial. It is, I think, great folly not to plaster clover, as it is the life of that plant, but injurious to wheat, by forcing extra height of stalk and additional sap, which delay the ripening. Lime is also much used as a fertilizer; in the maritime counties shell lime and marl, and in Middle Virginia stone lime. I have applied between 3 and 4 thousand bushels. I commenced with 10 bushels to the acre on clover, and turned it under with a three-horse plough.

I saw no benefit, as it was without doubt buried too deep—I then fallowed in the clover, and sowed 20 bushels lime and harrowed it in; and continued my experiments, adding 10 bushels per acre until it amounted to 60 bushels to the acre. In no instance was I rewarded equal to my expectations. Indeed, the crops were little if any better than the land had produced before. I remarked that the wheat stood up better, which I attributed to the increase of silica in the outer surface of the straw. The mowers said it cut harder and they had to whet their blades oftener than before. I have composted lime in alternate layers of earth, wheat straw, and lime, in bulks of 10 feet square, and 4 feet high, hollowed a little at the top, and with many holes made by driving a stake through, to admit the air and rain, and hasten the decomposition of the straw. This compost I have applied to various crops, and always with good results. I am decidedly of opinion that it is the most beneficial way that lime can be applied.

Very few of our farmers have turned their attention to the cultivation of the vine. I have a little vineyard of one acre, containing 600 vines, and have made some wine which was considered good. I find our native grape succeeds better than the foreign. If we have a good crop next season, I will endeavor to make a more detailed report.

In my wish to comply with your request, and answer the various questions in your circular, I have written a more lengthy communication than I intended, and not entirely satisfactory to myself from the want of more correct information. Wishing success to the Patent Office, from which emanates the most valuable document published by Congress, I will respectfully remark that you have omitted the article of tobacco in your circular.

Very respectfully, your ob't servant,

CHARLES YANCEY.

Hon. THOMAS EWBANK,
Comm'r of Patents.

MORRISSANIA, AMHERST COUNTY, VA., *Oct.* 10*th*, 1849.

SIR:—I will proceed to answer a few inquiries in your circular.

Wheat. Varieties, &c.—The May wheat was a great favorite of mine, some twenty years ago, in consequence of its early ripening, thereby avoiding rust; but it ceased, in time, to make a remunerating yield, and I discontinued its cultivation.

Red chaff (a bearded wheat) was next a general favorite, but this wheat was about six days later in ripening than the May wheat, and was liable to fall before it was ripe, in consequence of the weakness of its straw. It was however a productive variety, when it escaped the rust and remained standing until harvest.

The early purple straw I have cultivated for some years. The straw of this wheat is strong, not as liable to fall as those mentioned above, and it is about two days earlier than the red chaff; therefore I consider it a better variety.

Last year I sowed a part of my crop with the white flint, the yield of which was very good, but it was a few days later in ripening than the purple straw.

Enemies and Diseases.—The enemies and diseases of wheat with which we have to contend are, first in the category, *rust;* second, *fly;* third, *mildew;* and fourth, *smut.* Against the first there is no remedy, unless it be early

seeding, which subjects the crop to the ravages of the fly. Against the second our only chance is rich land, and sowing, if possible, in the month of October.

We must depend on dry, cool weather about the time of ripening for the third; and for the fourth and last, a change of seed is the only remedy I can recommend.

Soil and Manures.—A clayey soil is best adapted to wheat; such as a belt of red clayey land, resting on hornblende rock, extending through the counties of Bedford, Amherst, Nelson, and Albemarle, on the east side of the Blue Ridge.

The manures best adapted to the wheat crop will depend upon the wants of the particular soils—if alluvial, or such as are rich in humus, ammonia, &c., I consider ashes the best manure; if poor lands, such as the ridges near the *James River*, stable manure will probably supply more of the wants of the growing crop than any other; if light sands, such as are found in the tide-water region of this State, most of which have a mixture of clay, it will assuredly be the best manure.

Maize (or Indian Corn). Varieties, &c.—The variety of corn which I most esteem is the "double-eared," which has a white grain of moderate length between the *gourd-seed* and *hommony*, and is firm and heavy. It obtained the name of "double-eared" from the number of ears usually found on the stalks (two or more), which peculiarity has been effected by selecting for seed, for a series of years, the seed from stalks which had on them two or more ears, until double-eared has become a distinctive variety. This corn ripens about as early as any other, unless it be a few early kinds for table use. The early varieties are never very productive, and never planted for a crop.

I received a year or two ago a few grains of corn from the Patent Office called the Oregon, which I planted, and which proved to be the yellow gourd-seed, a variety I had known thirty years.

All kinds of grain in my opinion deteriorate, if grown on the same soil, or soils of kindred affinity, and this is the reason why all the new varieties are considered more productive. It is true that interested individuals frequently puff those they have for sale, and give exaggerated accounts of their productiveness, yet I have found by experience that a change of seed is necessary in a series of years, which always affords a more abundant yield.

The blade of corn I consider equal in value to hay of any kind; the shuck is a coarse food; it does not answer well for horses, but it is eaten freely by cows; it is of more value than wheat or oat straw, and takes a position between hay and straw.

My "experience as to feeding grain, whole or ground," is your next inquiry. It appears to me that there can be no difference of opinion as to the value of corn, ground and not ground, as food for stock; the former being entitled to a decided preference. I have the ears crushed and then ground, and believe, by feeding my stock with this cob-meal, that I save one-third.

I stated in the Patent Office Report, for 1848, that I considered the cost of the production of corn, taking ten years together, to be about 40 cents per bushel, and of wheat to be from 60 to 65 cents, and I have seen no cause to change that opinion. The usual weight of wheat with us is from 58 to 60 pounds per measured bushel; sometimes it is greater and sometimes less; that of corn from 54 to 56 pounds; the fixed weight of wheat is sixty pounds to the bushel, and it is always sold by weight. Corn is usually sold by measure, but when by weight, 56 pounds is allowed to the bushel.

Permit me to suggest to shippers of corn to Europe to make an experiment of corn shipped in the ears. We all know that shelled corn will not keep without being kiln-dried, yet in the ears, if carefully put up, it never injures; and I am convinced that if corn were suffered to remain in the field until November, then shucked, and secured in open houses well protected from rain, it might be shipped in the ear to any part of Europe, between January and May, without sustaining any injury. The cost of freight might be an objection, but the value of the cobs as food for stock in Europe would probably be worth their freight. But be this as it may, the increased value of corn delivered free from the injury it sustains by the kiln-drying process must be sufficient to make up the deficiency.

"*Horses and Mules.*"—The "comparative value" of horses and mules for farming purposes is another subject of inquiry. I decidedly prefer the mule to the horse for farming purposes, for several reasons; 1st, because of their greater longevity—the working life of a mule may be fairly estimated at eighteen years, whereas, that of the horse cannot exceed twelve. I mean from the time each is usually put into harness, until old age puts an end to profitable labor. 2d, the mule will be kept in good condition with one-third less grain than the horse, and is not as liable to disease; 3d, he can be fed if necessary on coarser food; and lastly, at leisure times the mule will fatten in ordinary pastures, whereas the horse must, under similar circumstances, be fed.

Sheep Husbandry.—In this particular section of Virginia, not much attention is paid to sheep, yet it is as fine a climate, and they might be reared and kept as cheaply as in any part of the United States, as our winters are mild, snow seldom ever covering the ground more than a few days, and in good pastures but little feeding is necessary even in winter. They are generally of mixed breeds, and their fleeces do not generally average more than four pounds per head as taken from the sheep.

Hogs.—Our hogs are killed at from one to two years old, and weigh from one to two hundred pounds; they usually are raised in the woods, fed on corn, and consume an average quantity of about ten bushels each, to raise and fatten, therefore as their average weight is about 150 pounds, and corn at 40 cents per bushel, will make the pork cost the farmers $2 67 per hundred pounds; to which add one-third for probable casualties and necessary attention, and our pork costs us about $3 56 per hundred pounds.

Labor.—The labor on our estates is generally performed by slaves. Those who do not own slaves, generally hire them. The small farms are generally worked by the farmers and their children; therefore but few white farm laborers for hire are to be found among us, and they hire at from one to two dollars per day, and board. Slaves hire generally by the year, for farm work, at from 60 to 80 dollars; and returned well clothed. To work on public improvements they hire by the year, at from 100 to 120 dollars. The cost of boarding slaves may be thus estimated for each grown person:

150 pounds bacon, at 7 cents . . .	$10 50
12 bushels corn " 40 " . . .	4 80
2 " wheat " 85 " . . .	1 70
Sugar, molasses, vegetables, milk, fresh meat,	5 00
1 cook for 20 hands, . . .	3 00
	$25 00

Plaster and other Fertilizers.—Plaster is freely used by many of our farmers with very happy effects, particularly on clover; indeed, to borrow an expression from one of our oldest and most successful planters (Major Yancey), "clover and plaster, like man and wife, ought never to be divorced."

Lime.—This mineral is not used extensively with us as an improver. I have tried it many years, but not with the marked benefit spoken of by agricultural writers; the straw of wheat is strengthened by its free use, although when put on farm-pen manure, well mixed, and suffered to remain two months, it benefits considerably the manure; but this practice of mine is against theory; for writers on agricultural chemistry contend that lime expels the ammonia, in its quick state, and ought never to come in contact with manure. To obviate this difficulty, I have covered the manure heaps, after the application of lime, with soil, and sprinkled them over with plaster.

Your other inquiries I will leave to be answered by persons having more information on those subjects.

Respectfully yours,

RICH'D G. MORRISS.

THOMAS EWBANK, Esq.,
Comm'r of Patents.

HALIFAX, NORTH CAROLINA, *November*, 1849.

SIR:—In compliance with the request contained in your circular, I would offer the following report of the crops, &c., in this vicinity:—

Oats.—I have cultivated the common or branch variety, and the side or ruffled oat indifferently; the latter I think yields the best, but that advantage is counterbalanced by its greater liability to fall or lodge.

As to their value as food compared with corn, the common estimate is that they are about half that value. My own opinion is, that as a food for hogs they are worth more than half the quantity of corn; but this opinion is founded upon the idea of the hogs eating them upon the land. Oats are becoming of late years decidedly more esteemed as a crop; the reason appears to be that upon stiff clay soils oats *eaten off* the land by hogs are a good fallow crop, especially for corn.

Of the varieties mentioned above, the branching oat is the earliest.

Indian Corn.—The white and the yellow are the varieties most usually cultivated; that portion of the crop which is shipped is generally in its character determined by the demand. This grain has a strong tendency to change into the common gourd-seed or Tuscarora. Varieties from Long Island, and from New Jersey, have been tried, and have exhibited that tendency; and wherever a selected kind is cultivated, great care must be taken to keep the seed pure or it will soon lose its distinctive character. The white is generally esteemed the most valuable as a breadstuff, and I believe it is generally conceded that the yellow is better for stock, especially for hogs. As a fodder the shuck is generally preferred to the blade, but it is more difficult to save in good order than the blade. Neither the shuck nor the blades, weight for weight, can compare with good hay as a fodder.

In latitude 35°, it is believed that green corn is nearly worthless for soiling; it is too watery. I have never known it tried to any extent.

The Tuscarora corn is thought to be the variety which was found in cultivation upon the settlement of the country. It is a light grain, but very

productive by measure, the ear being very large. It is objectionable as a crop, from the very large size of the plant, which renders thick planting dangerous. It is white and yellow, and the remarks made above apply to each of those varieties. I think this grain has been advantageously hybridized with the more flinty and small-growing corn, either white or yellow according to kind, and ought thus to be improved.

I have understood that pure Tuscarora seed, carried to the latitude of 30°, becomes nearly unproductive; the plant is large, but the grain exceedingly light and chaffy.

As to the difference between whole and ground grain, in feeding cattle, it is greatly in favor of the latter; between cooked and raw, the difference is not considered as worth the expense of cooking.

The weight of the best varieties of corn may be stated at 56 pounds, but that is not common; 53 to 54 would be found more general. It is impossible to give the general average of the whole State; the best farms yield about 30 bushels of corn to the acre; the average is thought to be increased by drill husbandry and thicker planting.

Peas are cultivated extensively in North Carolina as a food for man and cattle, and especially for hogs, and also as an improver of the soil; the kind most usually grown is the red, it being preferred because of its hardy nature, as it will lie in the field and be gathered by stock hogs during the winter, and even into the spring, and will ordinarily seed the land, if desired, for the next crop. The white and other finer varieties are cultivated as food for man. I believe as a food for stock they are nearly of the value of Indian corn; they are, I think, about the same price. They are much easier in the cultivation but more laborious in the harvesting. I never gather any but for seed, and therefore cannot say anything of the product per acre. I always feed them off upon the land, and greatly prefer to let the vine rot upon the ground rather than gather it as food for stock. I have for this reason no experience as to its value, compared with other forage; but they are certainly very valuable if properly saved.

Hogs.—The average weight of hogs in this State (North Carolina), at from 12 to 15 months old, may be stated at 130 lbs. If by "average weight consumed per head," it is meant to ask how much the laboring class consume, I should answer 200 lbs. per annum of the dead hog, for the whole population, that is the hog just butchered. Raising my hogs in the pea-field—fattening them in the oat-field and the pea-field, with a regular supply of corn to them only during the months when those sources fail, it is impossible for me to give any estimate in which I should have the least confidence, of the amount they consume, or of the cost of production, especially as I think so highly of the pea as to cultivate the crop *as a fallow*, if I did nothing with it.

The ordinary estimate is, that pork raised and fattened upon corn, costs about 10 bushels to the 100 lbs., and that the net weight of a hog is four-fifths ($\frac{4}{5}$) of the live weight.

Plaster.—This fertilizer has within the last three years begun to attract notice, and I have no doubt but its use will be extended. It is found to be very beneficial in connection with clover and peas, but the mode of its operation is quite a mystery.

Lime, in the various shapes of slaked lime of commerce, and of marl, is also getting into extensive use. From my own experience, I am not able

to say anything of its advantages or the quantity in which it is most serviceable.

Yours respectfully,

THOMAS P. DEVEREUX.

Hon. Thomas Ewbank,
Commissioner of Patents.

Milledgeville, Baldwin Co., Georgia, *Oct.* 18*th*, 1849.

Dear Sir:—I have concluded to send you an account of our county, which you may dispose of in whatever way you may think proper.

Cotton is the leading article of our crops, but there will be a small amount of it raised this year. The frost in April, with the extremes of wet and dry weather, have cut the crop very short, most farmers say half; but perhaps it will not turn out quite so bad.

The *Corn crop* is very good, being rather over an average yield. The wet weather in July has caused corn to rot considerably. The average yield of corn in this section is 20 bushels to the acre on fresh land, 30 to 40 on bottom land; on old land, unmanured, 8 to 10; but there is a great deal of land cultivated which does not make five bushels of corn to the acre; though by manuring and proper culture it might be made to yield 20 or more. Farmers in this county have not yet adopted the system of manuring; some few manure their corn land, but being put in the hill and the seasons not suiting, it fails, and in some instances makes less than would be made had the manure not been applied; but when the season suits it, the yield is increased three or fourfold. Our farmers must learn to cultivate less ground and to improve it, before we can profit much by farming. There are a great many farmers in this section that barely make a support, and but few that make the lawful per cent. on the capital invested.

Our land never will be improved to much extent so long as we continue to raise cotton. It is a year's business to make a full crop of cotton; and the man who makes it, has but little time to work at anything else—no time to make manure, or to haul out and spread the little that is dropped in his horse-lot; and but little time to repair fences, &c. Any cotton-making country will be a poor country.

Our *Wheat* was so injured by the frost on the 16th of April that there was hardly any made; perhaps not as much as was sown, and what was made is poor on account of being injured by the rust. Wheat is sown immediately after corn, and the fields are not unfrequently grassy, and then we have to sow late to avoid the fly. The general time of sowing is the middle of October, though it may be sown from September until Christmas. Late wheat is very apt to take the rust, but if it escapes it does well.

The kinds sown are the *big* and *little white*, the *bearded* wheat, and *Spring* wheat; each kind having its advocates. The average yield per acre is 5 bushels on common land, 10 on good land. The price usually $1, but varying from 75 cents to $1 50. The quantity of seed sown on an acre is ¾ of a bushel, varying from a half bushel to a bushel or more. It grows best on red or mulatto land.

The *Oat crop* is good where not injured by the frost; about the usual quantity sown, and a fair crop housed. The kinds sown are the *big white*, *fox-tail* and *little black*; the quantity sown per acre, from 3 pecks to a bushel; the yield 10 to 20 bushels per acre; the price 50 cts. per bushel; grows best on gray land.

Rye is very little raised in this section, except in lots for grazing and feeding to horses, green; it does not yield much to the acre, and is generally neglected. The quantity of seed sown to the acre is one peck; the yield 3 to 5 bushels; the price $1; grows high as the fence anywhere.

Barley.—The same may be said of the cultivation of barley; it is highly prized to feed to stock, green, and for grazing. The quantity sown per acre varies from 3 pecks to 3 bushels; the yield from 10 to 20 bushels; the price $1 per bushel. It is useless to sow except on *highly manured* lots.

Buckwheat is only raised by a few farmers in the county, for home consumption. We have none in our market except what is brought from the north. The quantity of seed sown on an acre is one bushel; the yield 8 to 10 bushels; the price $1.

Peas are raised by almost every farmer, among the corn, and are considered a valuable crop, though sometimes they kill a great number of hogs and cattle. This may be remedied by proper care and attention. Peas are planted in May, in the middle of the row, between the corn, and will average 3 to 5 bushels to the acre. Various kinds are planted, and they grow and do well on any soil that will sprout them.

Fruit has been almost an entire failure this year, owing to the frost. Some farms escaped the frost, and on these the fruit was good. There is not much attention paid to the raising of fruit, although apples, pears, peaches, plums, cherries, apricots, nectarines, figs and quinces all do well; some are even too careless to raise them for their own use.

Potatoes have turned out badly, owing to the dry weather in August and September. Irish potatoes almost a failure, being killed by the frost; yield per acre from 10 bushels to 100 of sweet potatoes, and about the same or more of Irish potatoes. It is a difficult matter to keep Irish potatoes through the summer, consequently we have to depend on buying our seed.

Hay is not raised at all; we use the corn blades for fodder, which is a poor substitute; the yield is about twelve or fourteen hundred pounds for 100 bushels of corn. We have some excellent grasses for hay; even the common crab-grass, which grows abundantly on every farm, would make good hay, but there is no attention paid to it in this respect.

Rice is only cultivated by a few for family use; none raised for market, though it grows well on low lands, yielding from 20 to 50 bushels per acre, with but little cultivation; worth 75 cents per bushel, rough, and 4 to 5 cts per pound, cleaned.

From the best information, it is supposed that about one-fourth or one-fifth of our land is in cultivation.

As to rotation of crops, the most common is corn first, then cotton, corn again, then wheat, oats or rye; after this, cotton, which always follows small grain.

Raising Stock.—More attention is paid to raising horses and mules than formerly, though not half enough are raised to supply the demand. Our farmers are beginning to find out that they can raise them cheaper than they can buy them. We have been in the habit of raising cotton with which to buy horses, mules, wagons, bacon, &c., but are beginning to find out that it is bad policy. We can raise as good horses and mules as can be raised anywhere, and the day is not far distant when they will be raised in sufficient numbers to supply the home demand at least.

Cows.—Not much attention paid to cattle; very few imported, though we

have some good common stock, but few that will give over one gallon at a milking.

Wages of Labor.—Farm hands average from $5 to $8 per month; mechanics from $15 to $20; slaves hire by the year at $40 to $60 for females, and $50 to $90 for males.

Factories.—But one in our county; that one goes by steam-power; it is an extensive establishment, and is doing a good business. Capitalists have found out that money invested in factories pays a better per centage than loaned out at interest. There ought to be one in every county in the State. The South should manufacture *cotton-bagging* to pack their cotton in. One bale of cotton would make bagging for about thirty bales, which would require 65,000 bales of cotton to make the bagging and several thousand to make the rope. This would give employment to 40 or 50 factories, and hundreds of poor people would be employed to operate them, and thus the means would be furnished them of earning an honest livelihood. When will the South begin to think of these things?

Agricultural Societies.—We have none in our county; several attempts have been made, but have failed.

I have procured some genuine Havana tobacco-seed from a gentleman in Mississippi, which I intend planting next year, and if I have luck with them, I will supply those who want to raise it. The gentleman from whom I obtained the seed, sells his cigars at $20 per thousand. He makes about $200 from one-fourth of an acre. Here is a chance for any man who will take the pains, to make a great deal from a small piece of ground; and he may extend his operations as much as he chooses. The labors of the farm at the South are not sufficiently diversified. They are too much confined to the single article—cotton. We depend too much on raising it to buy everything else with, and what is worse, to buy those things which can be produced here cheaper than cotton. The South should raise wool largely. Every farmer should have his flock of sheep, from which his cloth should be manufactured by his own family, which would save many dollars paid out annually for inferior cloth. Everything which can be raised or made *at home* should be done. Besides, we have vast quantities of uncultivated land, which is as good for sheep-range as any in the world. Thousands of sheep might be grown annually with little or no expense or trouble. Nothing which a man can buy will pay him greater interest than a flock of sheep.

Every farmer should raise his own bacon. Perhaps one year in ten, a man may see the time that he could buy it cheaper than he could raise it, but this will not do for a man who intends to live by farming. The same may be said in regard to horses, mules, &c.

Mills.—Flouring mills should be built; this would cause a great increase in the cultivation of wheat, which is at this time too much neglected. If such mills were erected, many would raise wheat instead of cotton, which no doubt would be as profitable. One or two would do a good business in our county.

If cotton could again become a profitable crop, and farmers could be induced to raise a *little*, improve their lands and keep up their fertility, we might yet prosper and get paid for our labor; otherwise we will keep our land poor, be poor ourselves, and leave our children poor; or, we must pull up stakes and move to where the soil is inexhaustible. It is the successive crops of cotton which have been grown on our lands that have so exhausted them. We must now rest and manure them before we can farm profitably

upon them, or they will cause us to be as bare of property as we have caused them to be of soil.

Yours respectfully, &c.,

WILLIAM C. DICKSON.

Hon. Thos. Ewbank,
Com'r of Patents.

Quincy, Gadsden Co., Fla., *Nov. 9th*, 1849.

Sir:—I have delayed my communication longer than I intended, hoping to be able to give you a table of the exports of cotton and tobacco.

From the best information I can obtain, the tobacco of this (Gadsden) county will produce about $200,000. This is one of the best portions of the State for the article. I now make a few additional remarks upon *Maize.* I cultivate four varieties, the *large-eared white*, the *yellow*, a *flint* (which I use for large and small hommony), and the large *North-River*, which I obtained of Grant Thorburn of New York.

I have put up a few ears as samples for you which I send by mail. I find the red-cob corn matures best. The North-River is an early corn, but yields per acre about one-fourth less than the white or yellow.

I have for 30 years steeped my seed-corn in nitre brine, a pound of nitre and eight ounces of copperas to the bushel of seed-corn, the grain to remain in steep from 48 to 60 hours before planting.

My rule in selecting seed-corn is to ride myself into the field accompanied by two hands with bags, seeing that they select only from stalks bearing two good ears, and of these the largest is gathered. My seed corn is then put away in a new crib erected on high wood posts four feet above the ground, leaving one and a half inches between the weather-boarding and cover. This crib is located about 100 yards from my corn-house. When housing my corn, I lop a china-tree and throw a quantity of berries, leaves and all, into the house with each load of corn. After the experience of a number of years, I find this to be a good preventive of weevil; and since I adopted the plan, my house has never been infested with rats.

As to rain, I keep regular tables daily, and if you wish and only signify the same to me, I will make you out a table for one or more years and forward it by mail.

Our seasons are irregular; some springs dry and a wet summer, and same as to winter. We have our coldest weather in February. The lowest I have ever known the mercury (Fahr.) was 14°, and the highest 48°; this is but rare. Our usual warmest weather is 92°—we have fine breezes, and our nights are generally pleasant. I have no barometer. I would state that my time of planting corn is from the last of February to the middle of April—fodder we gather in July and August—house corn in September and October. I expect to sow some of the bearded wheat in two weeks. I shall try an experiment next year with a new variety of corn from Alabama, it is said to yield well—about 40 bushels per acre; from 3 to 5 ears on a stalk. Respectfully yours,

DAVID L. WHITE.

Hon. Thomas Ewbank,
Commissioner of Patents.

BARBOUR CO., ALA., *November 5th*, 1849.

SIR:—A circular from your department has been forwarded by the Postmaster at Clayton, requesting information as to the agricultural interest of this section of the country. We must admit that to give anything like an accurate account is impossible, as we must be governed by our own judgment, and that of others we have consulted, having no accurate data upon which to base precise estimates.

Maize, or Indian Corn.—The yellow corn is most esteemed by planters, owing to its sound grain, not being so liable as the white corn to rot in the field, or so subject to the ravages of the weevil, which of late has been very destructive to the corn. It has been housed in the shuck, and in one or two instances salt water was sprinkled on each load as a protection, but with no beneficial results. Even the new corn in the field is infested with this insect. Corn is planted in March and ripens in September; very little use is made of the shuck, except in wintering cattle. As regards its value compared with blades, there can be no doubt, but that if properly prepared it would make a valuable food for horses, mules and cattle; and for milch cows, by adding bran, it answers admirably. Blades with us are not properly managed; hence much of their strength as food is lost. Instead of being housed as soon as cut, they are suffered to remain stacked in the fields, exposed to the sun and rain, which rot the end of the blades at least one-fifth. This is not only a clear loss, but becomes injurious food to the animal. As regards its value compared with hay, we are unable to say, as no hay is ever used in this section of country. In cotton-growing countries we are very deficient in preparing forage, and in making an economical use of it when prepared. The grain, when coarsely ground, is far preferable to feeding whole, as it is less liable to produce colic; far more nutritious, and a saving of at least one-eighth. When cracked and mixed with oats or rye, it is still more valuable; less heating to the animal when hard worked, and less dangerous than corn alone. I have seen horses fed entirely on cracked corn and oats moistened with salted water, which were very fat and sleek, although they were worked constantly and very hard. In fattening hogs, ground corn scalded, and mixed with bran, pumpkins, turnips, potatoes or slops, will fatten in half the time, and require but one-eighth of the corn. Too much cannot be said in favor of grinding corn for stock of all kinds; and on all well-regulated plantations, mills should be erected, if to go by horse-power, for such purposes. None except those who have tried it can estimate the saving and advantage of grinding corn for all feeding purposes.

Peas are planted more for stock pastures than for a fertilizer. But with some they are becoming unpopular, owing to the opinion that they kill stock; and the ground-pea or ground-nut is being substituted in its place. So far as my own experience goes, I have lost horses and cows by over-eating in the pea field; but never have found them so fatal to hogs, as they have been reported by others. As a fertilizer, no experiments have been made by sowing down and turning in with a plough when in its luxuriant state of sap. But when sown thick, and as I have done, sown broadcast among the growing corn, it answers a fourfold purpose; 1st, it soon shades the land from the influences of the hot sun; 2d, it keeps it from washing by rains; 3d, it affords pasturage; 4th, the great litter left by the vine and leaf is finally turned under as a fertilizer. I have found this system well adapted to the purposes just described, and exceedingly beneficial to the land. Some planters gather the vine with the pea on it, and stack it for forage; it makes excellent winter food for cattle, but robs the land of a vast amount of litter for manuring purposes. I consider the pea crop too valuable to abandon on account of its deleterious effects on hogs; and I think more hogs have died *for the want of them* than from eating them.

Cotton.—This is the all-absorbing product of this section of the country. At so early a day, it would be impossible to say what will be the average product of the State, or even of the county per acre, or per hand, as solicited in your circular. The crop has encountered a series of disasters from first to last. The late frost in April killing the first planting; the excessive rains in May, June and July, and a sudden and severe drouth in August, all injuriously affected the crop. However, a very large crop was planted, and after the frost replanted, and it is now safely estimated from inquiries in all quarters that the crop will not fall short of 2,000,000 bales. There have been some new varieties of seed introduced in this section, the *banana* and the *sugar-loaf*. The first has been tested on a *small scale*, but with the most satisfactory results. Its yield was over 3,000 lbs. per acre. But these small-patch experiments will not always do to rely on, as in general culture a large patch is neither prepared nor cultivated so well. Hence the regular field system must be adopted to test the value of any new seeds. The *sugar-loaf*, sent here by Dr. M. W. Philips, was tried in the regular field system, under ordinary management, and the result was most satisfactory. It produced 1200 lbs. per acre; an average of 400 lbs. more than the *Petit-gulf*, and under the very same management. The process of cotton culture has altered in no way to my knowledge from what it has been for the past six or eight years.

Respectfully yours,

JNO. H. DENT.

LOG HALL, EDWARDS, MISS., *Nov.* 1*st*, 1849.

SIR:—I have postponed a reply to your circular of July 1849, for various reasons, but more especially that I might give you, and through you our fellow-citizens, as accurate knowledge as it be possible for a man living in the country to give.

I must begin by thanking you for the distinguished consideration you are pleased to mete unto me. I feel it no small matter to be selected by your department as one who has some competency in being useful, and I assure you, I trust ever to be found prompt to add my mite to the sum of human knowledge.

Permit me to take up your circular in the order in which you propose subjects for inquiry, and to give such remarks as I trust will be acceptable to many readers.

Wheat.—I have grown wheat only one year. I found upon the richer low lands upon my place that the straw was longer and stood up well, heads larger, but it rusted before filling; upon clay land, I made 10 to 12 bushels per acre. I knew, a few years since, a Mr. McLaurin, of Sampson Co., to have wheat that averaged 62 lbs. I think, and he assured me he had made 40 bushels per acre—pine land and cow-penned. Mr. McL. was a highly respectable gentleman, a most noble host, generous to a fault, if it could be, in entertaining friends and strangers. He declared that Mississippi was a better wheat country than North Carolina, and that he had not had an

entire failure, nor but one partial, in 25 years, I think; whereas, in North Carolina, he had had failures every four years.

Oats.—This crop is sown pretty largely; I have seen more than 200 acres on one plantation. We sow all sorts, ruffled, white, black, and the Egyptian—this is a white oat and weighs 42 lbs. This latter is generally preferred in middle and South Mississippi. We sow them in October or November, or even in December or January. They will stand any cold here, and furnish excellent food for hogs all winter. We feed them to horses, cattle and sheep, but they will not do more than keep horses and cows from starving. Some folks regard them as a good pasture, but I do not; and I think the advantages are, saving of labor in the spring, and their being fit for feeding earlier than spring oats, and yield, I think, better than any I have tried, except the potato oat of England. Oats for feeding are cut by the 3d of June, seed oats on the 11th. Mississippi has not had due credit in the statistics of the U. S. as to her oat crops. We consume more food here, man and beast, than any other population upon earth, except in similar latitudes with a similar population and similar pursuits. More grain is wasted in such a country than feeds an equal population in some places.

Rye.—This grain is but little cultivated, and only as a winter grass, I might say. I have ploughed in, as a green manure in March and April, 50 to 100 acres in one year; and it requires no ploughing when sown upon cane or cotton land; it is a great advantage in preventing the washing of land from our winter deluges, as also a vast green crop to turn under, and gives an excellent winter pasture.

I will remark here that Egyptian oats will yield about as much when sown on cane or cotton land, in October or November, as if the land had been ploughed; I prefer to sow both these grains without ploughing in, and I have tested the matter effectually.

Barley.—I never saw it growing in Mississippi.

Maize.—I prefer a grain intermediate between flint and gourd-seed. I think there is more shuck than with the former, and not so much injured by the weevil; it is heavier than the latter, and where the selection is made from medium stalks, it bears closer planting, and yields better than either, weight and measure included.

Flint corn is more destroyed by weevil than any I ever planted. But little pure flint is grown. The gourd-seed is thought to produce more, but I deem it light and too chaffy. The flint and gourd-seed both ripen later than the variety I plant, and both have larger stalks. With some the flint (or probably it may be called the ⅔ds flint, as it is not pure) yields best. I plant a variety of corn we call flint, for bread, which has been grown by the same planter for nearly 40 years; he says it is the same as when he began. I have seen remarks about change, but being an experimenter for these 18 to 20 years, I have seen none of it. Without ordinary care, it will deteriorate, I believe, but no more can I admit.

I use the shuck passed through Sinclair's straw-cutter for feeding mules, mixed with fodder and oats. I regard it as equal to fodder; and when the mules are taught to eat it, the shuck is healthier and stronger food. I prefer good hay to either. I have used the corn cut when in roasting ear for stock, and some broadcast, but not for soiling. I have now several tons of the latter housed for winter feed.

I have used corn ground and whole for horses, mules, cattle and hogs,

and think there is a saving of full one-fourth; if cooked for hogs, the saving is full one-third.

The crop in Mississippi, so far as I have information, is shorter than for years—and, as we have learned in the last few years, to use it lavishly the deficiency will be such as to make it high all next year.*

Hay, properly speaking, is but little used. We rely on corn blades. There is much crab-grass hay and pea-vines put up for winter feed. And I am very sure we make more provender for horses and cattle than we have ever had due credit for.

Cotton.—"*Vick's* 100 *Seed*" is as good now as the first year after given to the public; it was never vaunted to be other than a patient close selection of the Mexican or Petit Gulf. Col. H. W. Vick has done more in his constant perseverance in this selection than any other man in our country. There have been many varieties that lived just long enough to humbug those who had any enterprise, and then died off. There are many planters who deem themselves too smart to be humbugged; and there are many others of a race too smart to believe anything, except that dimes give character and sense. These people do themselves an injury, and they injure the cause of improvement. I acknowledge that Mastodon and Otra cottons were humbugs; because many created a false impression when they knew there was not a corresponding value, they would have sold seed at $10 per bushel, though they knew the seed would be planted only as long as the product was unknown. But, admit all this humbuggery, and that the U. S. lost $100,000 by it, and a few men pocketed the same—yet, there has been and will be improvements that will enhance the value of cotton estates millions of dollars, and much of this I attribute to the patient perseverance of Col. Vick.

Brown seed stands next in the estimation of planters; these seed you distributed last year. Some planters consider this the best, but I give my own opinion, leaving others to state theirs. I deem this to be identical with the Tarver seed of Alabama, and the same which Dr. N. B. Cloud planted with such remarkable results.—I have planted the Brown seed two years, and am convinced the sugar-loaf is *here* the most prolific and the earliest. I have used seed each year from different sources, and will try them another year.

Pitts' Prolific is also much praised. Here the bolls are small and not easy to pick. I do not think of continuing the variety.

Hogan's.—Although not as good as last year, yet I will continue the variety. Some stalks are remarkably prolific—bolls large; from these I have selected; too many stalks are common, showing the big prices to have caused the sale of all the seed.

Banana (of Warren Co., Miss.) is *identical* with the above. *I know it.*

Prout is the same seed, and the parent of the above.

Cluster, the original seed procured by Mr. Prout, from Georgia, as he informed me.

Pomegranate, ushered to the world by General Mitchell, of Miss., with such great flourishes of pen and type, I have reason to believe is the same seed. I only know it from description. This tallies with the above, and Mr.

* I do not know that the weight is established by law for any of the grains. The improvement in culture has shown an improved per acre crop, especially of corn. What the average is would be difficult to say; yet I think that, for good ordinary years, maize may be estimated at 25 bushels. Of small grain we never note.

Hogan informs me that Gen. M. bought a pint of seed of him 2 or 3 years ago.

Multiflora, a new variety. The producer claims some 40 pecks of increase of lint. The production is large. I will plant an acre next year. Only had about 100 seed this year.

Mammoth, a few stalks only in culture; bolls very large, and not having yet picked a boll, I can only say it stays in the boll well, and is productive enough to induce further trial. A part of a crop might be planted and kept for late gathering, this Nov. 15th, 1849.

Manures.—I have only used stable and cow-lot manures, and cotton seed. I cannot say which is best. Enough of either will suit Mississippi, for a long time yet to come. There is no change in culture for several years at least, and the process I described in the American Agriculturist is getting into more general practice.

Orchards.—The interest on this subject is greatly on the increase; many planters are putting out the choicest fruits for home consumption. I could easily give you many sheets upon this branch of rural economy, but so much has been written on the subject, and so well, that I must refer your readers elsewhere. I deem it however right to say that, in my opinion, Northern fruits can be successfully cultivated here.

With great respect, I am
Sincerely yours,
M. W. PHILIPS.

Hon. Thos. Ewbank,
Com'r of Patents.

Washington, Miss., 15th *November*, 1849.

Dear Sir:—I have often tried to draw up a series of answers to the queries from the Patent Office; but could state so little that was satisfactory, had so few *facts* as a basis, that I gave up the attempt. I shall try it again, however; and have placed the extra circulars sent to me in the hands of those I thought might possibly fill them up, but fear few will do so.

Cannot the several States be induced to require of the tax assessors of each county to fill up a series of condensed points and queries, to be put to each planter assessed? I know of no other way in which you can procure the statistical facts you require with any degree of correctness.

A second edition has been published of the "Plantation Record and Account Books," which I prepared for publication at the request of a publisher in New Orleans. They have come into very general use, and will in a few years afford a mass of the most valuable information, of the very nature required. You will receive herewith a copy of each number for different sized plantations, with the hope that you will give me the benefit of the experience of your office in suggestions for the improvement of the next edition; that the work may be made the means, if possible, of preserving a still greater amount of that information of so much importance to the country. But to the several questions in the circular before me.

Wheat.—There is but little grown in this district. In the adjoining county of Jefferson, good crops have been grown, with occasional discouraging failures from long drouths. There is no doubt but wheat can be grown profitably, but not until the wants of the soil are considered and supplied.

Oats.—Singular as it may appear, this, looked upon as altogether a northern grain, succeeds well here. I have imported many varieties from Scotland and France, and have grown them successfully; but have found none of them to compare with the variety known as the *Egyptian* or *winter* oat. It has been in the South many years, perhaps fifty, and is *thoroughly acclimated.* Of the importance of acclimation, more anon. I have repeatedly found this grain to weigh 42 lbs. per bushel. The grain is white, large and plump. It is sown in September and October, and even later; ripe during May, according to the season and soil—with me, during the first and second weeks. Affords excellent winter pasture. By planters and overseers generally, the oat is considered to be very inferior to corn as food for mules and horses, during hard work. The cultivation of the oat does not extend much, arising, it is to be feared, from an indifference to improvement or change, and from the trouble attending the cutting and threshing. This variety, the Egyptian, is invaluable, not only as a fodder crop, but for winter pasturage and as an auxiliary in improving the land.

It is advantageously sowed amongst the cotton, after the first or second time it is picked over, or amongst late corn; the sweep or cultivator being used to cover. During the winter the stalks are beat down as usual, not at all interfering with the cutting of the oats. If intended for the improvement of the land, hogs or other stock should be turned in when the grain begins to change color, and when they have eaten it pretty clean, plough the stubble under and sow cow-peas; these to be fed *off*, in turn, to be followed by oats again or clover.

Rye.—I have grown the *Multicole* and the St. Johns-day rye, or "*Seigle de St. Jean,*" imported from England and France; neither of these were superior to the common "up country" rye; unacclimated, this last, after being grown here some three or four or more years, yields fair crops, and is sown to a small extent for bread; although otherwise valued by some, is inferior to the true Egyptian oats for winter pasture, or fodder. If desired, you can have a supply of these oats next summer for distribution from your office.

Barley.—Am not aware that it is grown. Have tried some half dozen sorts, as also *bear* or *big*, imported from Scotland, not worth the trouble and expense.

Maize.—Many varieties are grown, principally those known as flint and bastard flint. The gourd-seed varieties are very objectionable in this climate; principally on account of their softness rendering them unfit for bread, and open to the attacks of insects in the field and the crib. We require a grain *white*, *hard*, and rather flinty—*white* because of its great consumption in bread and hommony; in the preparation of both of which our cooks greatly excel. When meal is ground for bread, the mill is set rather wide, that the flinty part of the grain may not be cut up too fine, this being sifted out for "small hommony;" the farinaceous part of the grain is left for bread. This hommony is a beautiful and delicious dish. On most plantations the negroes have it for supper, with molasses or butter-milk. A *hard flinty* grain is necessary to head the weevil, with which not only the cribs but the heads of corn in the field are infested. These are the *Calandra oryzæ*, the true rice weevil; distinguished from his European cousin by the two reddish spots on each wing-cover, and known among us as the "black weevil;" also a little brown insect, not a true weevil, but a *sylvanus*, as Dr. Harris writes me, to whom, through his invaluable work and private correspondence, I am indebted for much of that little I know of the

insects injurious to agriculture. This sylvanus and another of the same genus, most probably the *S. surinamensis*, affect the corn in the field before it becomes hard, causing serious damage—but nothing to equal that occasioned by the black weevil.

I know of no generally successful method of staying or even checking the injury caused by the insects; though much might be written in the way of suggestion.

Almost any variety of this grain planted even as late as the 10th of July, will ripen in our fine climate. There is thus no difficulty, where the land will bear it, of ripening two crops of corn on the same ground in one season.

As to the change of character and qualities from change of climate, I will speak anon.

I consider the shuck to be richer and stronger food than the blade, which is but chaffy at best, when gathered from stalks which have matured grain, and is moreover the most costly article of fodder that is fed in any country. It costs some 8 or 10 per cent. of the grain, in weight and value, by being stripped before the grain is ripe. It costs no trifle from the injury the cotton crop sustains, from being deprived of a thorough working, at a stage when such a working is of great importance to that crop, by the necessity for fodder pulling at that very time. And the cost of pulling is great, indeed, inasmuch as that a hand cannot pull, bundle and stack more than 3 to 400 lbs. per day; during which his health suffers more than at any other work; still, it is doubtful if the dependence upon blade fodder in the South be ever greatly lessened.

I suppose blades to be equal, pound for pound, to timothy hay as received here in bales, superior to crab-grass hay (*Digitaria sanguinalis*); all three inferior to sound shucks; and none of these at all to be compared with hay of Bermuda grass (*cynodon dactylon*), the most productive and nutritious grass in hay or pasture of which I have any knowledge.

Of green corn, grown in drills for stock of all kinds but hogs, and especially for cows and work oxen, it is difficult to estimate the value. I grow acres of it sowed in succession through the spring and summer, curing for winter fodder all that is not consumed when the ears begin to form. It seems wonderful how it can be dispensed with.

Where the work is done by plantation negroes, it is generally best to feed corn in the ear. Grinding and cooking are unquestionably economical practices; but difficult to be kept up with frequent changes of administration, under different overseers, where the planter is not always on the spot.

Rice.—I have grown, and some of my neighbors still grow, common upland rice with the most perfect success, gathering the heaviest crops known of any small grain; unless perhaps oats occasionally in Scotland. Grown in broad drills, say three or four feet apart, and tended with hoe and cultivator, requiring two good workings, nothing is wanting but some degree of encouragement, and the spreading of proper information, especially in the pine-woods regions, to make this a staple and a profitable crop. On the small pine-woods farms in the interior of the State and along our sea coast, upland rice is grown in considerable quantity and of fine quality; but for the want of mills or a market for the rough rice or *paddy* it is fed mainly to stock. I forwarded a sample to Liverpool recently to learn its value as

paddy, and have no doubt that it will bear shipping with profit.* Such inquiries should be the duty of a general and state boards of agriculture. The tax upon the time and pocket of those individuals desirous of procuring and disseminating such information, and of introducing, testing and acclimating new trees and plants is too great, and should be borne by the general government.

The pine-woods farmers speak of their sandy lands, usually considered of little value, being capable of producing some three fair crops of corn, and four or five of rice, with an occasional crop of sweet potatoes, before they are utterly *worn out*. They also say, that if the straw be returned to the land it will produce many successive crops of rice. Manuring, except to a limited extent by cow penning, is never practiced.

In answer to your *note*, it would be the merest guess-work, equal to guessing at the growing cotton crop at 1st of September, to state the "cost of production," the "average per acre," or the actual aggregate product of our State; and therefore I will not attempt it.

Of the "usual weight"—I had a good, sound common-sized flour barrel filled three times, settling the corn each time when filled, by shaking the barrel moderately, from the pile of corn (bastard flint, similar to the well-known Baden), as hauled and quite closely slip-shucked in gathering. When shucked and shelled, and the shelled grain poured into the barrel, it lacked four inches of being full, which I estimated at half a bushel.

The shelled corn weighed, net, 173 lbs. Add shattered and shelled off, where unsound at the points, 2—175 lbs., or $3\frac{1}{8}$ bushels of 56 lbs., our legal weight. The corn measured, in a sealed half bushel, $3\frac{1}{8}$ bushels. The corn was sound and good, with a moderate proportion of nubbins. It is to be inferred from this that a barrel of corn must be closely slip-shucked to average, to a certainty, a bushel of shelled corn; and our southern white

* The house to whom I forwarded it, Messrs. E. Zwilchenbart & Co., write to this effect: "We submitted the samples of paddy rice enclosed therein to our brokers of the article, who report that it differs considerably from what they have usually seen imported from Charleston; it appearing to be more of the Java description, being short and plump in the grain. As the consumption in this country runs entirely upon the Carolina and Bengal kinds, your sample cannot be *accurately* valued; but from comparison with the Java and Brazil paddy, which has occasionally been sold here, we should consider the present value to be 3s. per bushel, which, presuming the bushel to weigh about 44 lbs. would give 7s. 6d. per cwt. The imports of paddy from Charleston and Savannah are always in bulk, but if great care be not bestowed upon its condition when shipped, and also upon the stowage, it is liable to become heated, whereby the color of the rice and consequently the value of the paddy is affected. This fact renders its value on arrival always more or less uncertain, and an allowance on this account should in every case be made.

"Freight from America to this country is at present exceedingly low, and from the manifestation of the U. S. Government to reciprocate our late free trade movement in the abolition of our navigation laws, we think there is every likelihood of its continuing so. From last advices, the freight of flour from N. Orleans was 3s. per barrel, which will give you an idea so far to make your calculations. Delivery charges may vary; viz., when the stuff is sold from the quay or ex-ships, or if it has been warehoused. In the latter case, of course, they become higher. If sold ex-ships, they would range about one penny per bushel; going into warehouse, the cartage, &c., require to be added. Perhaps the best plan to test the value of the article would be to ship a dozen or twenty hhds. on trial, the outcome of which would be a guide for the future. We will be glad to take charge of any quantity you may feel inclined to send in this way, and to draw the best possible result therefrom."

In the absence of such means of procuring information of the foregoing character, I have found the excellent house named above at all times ready to answer inquiries promptly and liberally.

corn, from which the blades have been stripped whilst yet green, will weigh, if sound, exactly the legal weight of 56 lbs. per bushel. All grains are bought and sold in the loosest possible manner, all through the South-west, unless in New Orleans.

Hay.—With the exception of crab grass, pulled by hand from amongst the corn, where it comes up thickly after that crop is *laid by*, there is but little hay made. There are some small meadows of Bermuda grass about this neighborhood, from which the most extraordinary cuts of hay are annually taken.

There is no business whatever of an agricultural character that could equal in the results extensive meadows of this grass, on the Mississippi bottoms, producing hay for the New Orleans market.

The land being level, mowing machines might be used; more readily as the surface of a Bermuda meadow must be made very smooth before it can be cut to any advantage, even with the scythe. Hay, in New Orleans, is rarely so low as fifteen dollars, and is frequently up to $30 and even $40 per ton. Being on the river bank, the market could be watched and supplied when prices were highest, and there would be little or no expense of hauling. Land now rendered almost worthless by the bitter coco (cyperus), may be applied to this purpose, as the Bermuda will overcome the coco, by top-dressing and mowing. I repeat (see Southern Agricultural Almanac for 1848, page 61), and can refer to numerous witnesses to prove, if needful, that we have measured the ground and weighed the well-cured hay, and this more than once, when *one cutting*, and that *the second one that season*, yielded over *five tons per acre.* After that, a very fair *third cut* was taken from the same ground. *Five tons per annum* is a moderate yield from a good, well-set Bermuda meadow, which is either top-dressed with sludge from an overflow or receives one of manure annually.

It affords equally valuable pasturage; but is a pest in the crop, only to be destroyed by a smothering crop of corn and pumpkins, clover or peas. By this means, I find no difficulty in *checking* and even eradicating it.

We have reports of hay made from *leersia orysoides*—"Rice's cousin," as the negroes call it, and a valuable grass here, though pronounced by Dr. Darlington "worthless." From *Eleusine Indica*, or dogs-tail grass, "crow's foot," of this region, which on manured land grows with great vigor, though an annual grass. From Nimble Will (*Muhlenbergia diffusa*), which also, in some soils, and especially in wood land, originally of *Magnolia grandiflora* growth, but from which the magnolias have been cut, leaving only the deciduous trees, makes excellent pasture. And in wettish flat lands, from several varieties of *Panicum crus-galli*, which there grow vigorously, not unfrequently mixed with *cyperus repens*, sweet coco, or nut grass. And some speak of hay from Guinea grass (*Tripsacum dactyloides*), which certainly grows vigorously, affording frequent cuttings, and objectionable only thus far, that in no condition or stage of growth can ever mules be induced to eat it freely; at least such is my experience.

I am not aware to what extent experiments have been tried with other grasses. I have imported from Europe seeds of over forty kinds, from Texas and the far West over ten or a dozen, and have also tried any number of native (?) grasses with varied success, of which the relation might be of some interest; but will only remark here, that after careful and repeated trials, I have found no grass to compare, for hay or pasture, with the one commended above—Bermuda grass, the Doub or Dub, the sacred grass of the Hindoos.

Of its value for summer grazing, I must state further that it far exceeds that of any other grass within my knowledge in abundant yield, in sweetness and in nutritive qualities. On the common around this village, there are cattle, horses, mules, sheep, goats, hogs and geese innumerable, all the year round, from the first evidence of renewed vegetation in the spring; and yet they are not all able to keep down this grass which covers the common; and during the summer, when it flourishes most, much of the stock is in fair order.

Of Clover (*see Plaster*, &c.)—It may be well to add that late in the fall, when the cotton is stripped of its foliage, the fields become green, where the soil is at all good, with various annual grasses and nutritive plants, which afford sweet pickings to stock, and especially sheep, all winter. There are the "winter-grass" of this region, the nearly universal *Poa annua*, here at times almost rank in its growth, reaching a height of from four to eight inches. Chick-weed (*stellaria media*), of which cows are very fond, as also sheep, covering the hill lands where rich with quite a heavy growth. *Phalaris Americana*, a beautiful southern grass depicted in Cellist's work. *Hordeum pusillum* of Nutt, a dwarf barley, or, as here called, "Texan Rye," forming sweet grazing before the blossom drops. *Alopicurus geniculatus*, floating fox-tail of the English, almost as valuable as the winter-grass. *Trichodium laxiflorum*, hair-grass, also springs up. These are nearly all annual *winter* and *early spring* grasses. In the fence corners may be found a good bite of Nimble Will, and on poor spots of fox-tail. Within the last few years, a creeping grass, somewhat in its habits like the Bermuda, has spread to a considerable extent over the open pastures. It is known by some as "Cuba-grass," and is a *paspalum* or *digitaria*, I know not which; the sheep find sweet picking from it. On the sea-coast, about Pass-Christian and Pascagoula, I find a close good sod of another grass, of similar habit to the last named, of which I have not been able to determine the name. It makes a very pretty pasture, and grows well even in a partial shade. Old pastures become infested with a coarse grass, growing in tufts, known as "Natchez grass," *agrostis Indica*, or black seed-grass. I think it of little value; in fact a filthy pest.

Such is an imperfect sketch of the grasses most common and useful in this portion of the south. It is a branch of botanical knowledge the most difficult to acquire, and assuredly sufficiently neglected. Would that the directors of the Smithsonian Institute might be induced to turn their attention to the subject, and give to the world a work upon the Graminæ of this continent, native and introduced, worthy of the subject. If there is no hope of this, cannot your department take up the matter? There is no one topic of so much importance to the agricultural community. We have been again and again promised a work of the kind, but as yet nothing has appeared. Each and every grass should be depicted, and that in the very best style of the art.

I have said nothing of a grass frequently spoken of lately, "the Muskeete" or more properly "Mesquit" grass, and for the reason that, though I have received, after much trouble and expense, various lots of "Muskeete grass-seed," comprising five distinct varieties, only one of them is of any value; and that I cannot name as yet, but will be glad to send dried specimens of this and all the other grasses to be found in this region, to two or more botanists, who can assure me that they have made this depart-

ment their particular study, and who will aid me in identifying and describing them.

I am not aware that *irrigation* of meadows has been practiced.

Peas.—No varieties of the genus *Pisum* are grown, except in gardens. But the pea, or more properly bean, known as the "cow" or "Carolina" pea, is grown to a great extent, as food for man and beast, and for the improvement of the land. In all that has been written upon this very valuable plant, second only in value to maize in these Southern States, in no instance can I find any reference to its origin or botanic name. Having examined all the authorities within my reach, and caused many extensive libraries to be searched, and inquiries to be made in Europe, I have come to the conclusion that in any or all of its numberless varieties, it is hitherto undescribed, or described very imperfectly, and am, therefore unable to answer the inquiry so often put, of "What *is* this cow-pea?" I am not competent to a botanic description; but will have pleasure in communicating the information acquired, and in forwarding seeds and dried specimens to botanists who are competent. It is evidently a *dolichos*; but if described at all, is most probably classed as a *phaseolus*. There are many *species* as well as *varieties* cultivated under the general name of *cow-peas*; ranging in size from that of a grain of wheat, to that of the smaller varieties of snap-beans. In color they vary still more; snow-white; white with black, red or yellow eyes; jet-black; purplish-red; yellow; speckled, like the early valentine bean; greenish-gray, like the gray field pea (*pisum*) of England, &c. Some grow very vigorously, covering the corn stalks, when planted among that crop, with a perfect load of vine and leaf; whilst others scarcely vine at all. The blossoms are of different colors and sizes in the several kinds; and the pods are some flat and some round; in some the pods stand out stiffly, in others hang loose; but all the kinds bear a strong family likeness.

The cow-pea is most commonly planted between the hills of corn, at the second hoeing. It does not vine much, nor bear pods until after the fodder is pulled; it then covers the stalk, ear and all, with a mass of foliage; affording, undoubtedly, a very large amount of food for stock, which are turned into the field after the corn is gathered, and vegetable matter to be returned to the soil. But the injury to the soundness and keeping quality of the corn, and the multiplication of weevil under the shuck, from the shelter and moisture and soft condition of the grain—all of which weevil we carefully gather with the corn, and house with it in the crib—it is to be feared greatly counterbalance the advantages. Stock, too, are very frequently injured and in many cases killed by being turned into the corn-field to feed upon the peas. Many of the peas have sprouted or moulded, and not a few are in a state of partial decay before this can be done; hungry cattle and hogs are not very discriminating; hence the injury. Our southern agricultural papers contain many lengthy articles, pro and con. Although it is certain that great and sudden mortality has occurred among cattle and hogs, and occasionally even mules and horses, after having been some days in the pea-field, it is equally certain that a great majority of careful planters have been in the constant habit of consuming their peas in this way for many years without any such results.

It is, however, as a fodder-crop and as an improver of the land that this plant is of the greatest value to the south. Land, when "turned out," that is, when so far exhausted by repeated croppings and ceaseless cultivation

as to be no longer capable of yielding a remunerating crop—is generally so much worn out as to be unable to produce a crop of even weeds to afford protection from the sun. Even the cow-pea will not make a cover, unaided. Manuring, unless in some simple and easy way, will not soon be practiced, even to the extent to induce a growth of pea-vine. A cheap and easily applied manure for this purpose, I have found to exist in marl and in plaster (sulphate of lime) and of which I shall speak under that head.

I can give but little idea of how many bushels of this pea is produced per acre; most probably, when grown amongst the corn, from ten to twenty. They have to be picked by hand, pod by pod; each pod contains from 18 to 22 peas. They sell at $1 per bushel.

Root Crops.—The Irish potato is grown to some extent, almost entirely for home consumption; unless near the rivers, where pretty large crops are occasionally grown for the New Orleans market. They produce well, and are large and mealy. Can give no particulars as to cost of production, &c.

The turnip is also grown in considerable quantity for plantation use; rarely for stock or for sale, though yielding large returns for the labor requisite.

Carrots, beets, mangold-wurtzel, &c., only in gardens. The artichoke I have grown to some extent, but do not value it highly.

Skirving's improved Swedish turnip (Ruta-baga) I have found a very valuable root, productive and highly nutritious; and continue to grow them.

Maranta arundinacea, which yields the arrowroot of commerce, I have tried so far as to prove that it may be made a profitable crop.

The "Pindar" (ground-nut) is grown for market by the cultivator of sandy pine lands, and generally by the negroes; by some planters as food for their hogs, which are allowed to harvest them. I have found them an extremely exhausting crop for the land.

The sweet potato is an important root; and they are grown in great quantities; though not to an extent commensurate with their value as an agreeable and nutritious article of food for man and beast. I have bestowed much attention on their cultivation; to the habit and growth, and to the comparative value and productiveness of the different varieties.

Cotton.—The questions under this head would require a lengthy treatise. You will, most probably, receive more than one essay in answer.

If you will send an artist this way, capable of making the necessary drawings and plans of gin-houses, presses, cotton-thrashers, &c. &c. I shall take pleasure in drawing up a lengthy article, which might, by such means, be rendered both interesting and instructive.

You will perceive that in the Plantation Record and Account Books sent herewith, I have provided for much of the information sought for; average yield per acre and per hand; cost per pound or per bale, of production, freight charges, commission, &c., paid by planter, and more of a similar character and of like importance.

Sugar must be left to those having a better knowledge of the subject. It has within the last three years been grown successfully and profitably in the hills thus far north, and upon lands which no longer produced remunerative crops of cotton. There is no reason why it should not displace cotton to a great extent. P. M. Lapice, an extensive and very enterprising public-spirited planter, in the Parish of St. James, has demonstrated for some fifteen years or more, that sugar-cane thrives as well, and ripens as many joints, at his cotton plantation opposite Natchez as in St. James.

Hemp has been grown in this State on the banks of the Mississippi, and that successfully, but I have no knowledge of its cultivation as a crop.

Butter and Cheese.—The former is made in as great perfection as in any part of the world. Every planter's wife makes an ample supply for her table, and occasionally enough for the inhabitants of the towns in the vicinity. But, as a business, I am not aware that it is carried on within the limits of our State; although there is no part of the Union where it could be made so profitable. Good butter averages the year round over 25 cents per pound, often commanding 40 cents, and never under 25 cents.

Land is cheap. Good cows can be had at moderate prices, from $15 to $40, yielding from two to twenty quarts per day, according to the selection of animals, and the manner they are fed. With industry and judicious management, abundant pasturage and an ample supply of green food can be had all the year round. During continued wet weather in winter and early spring, when it would not be advisable to allow the cattle to puddle the land, fodder from the cow-pea, cured vines, peas, and all, as is commonly practiced, with Swedish turnips, beets, carrots, sweet potatoes, cabbages, &c., may be used. A farm should be properly arranged for the business, subdivided, that separate pasture lots of Bermuda grass might be grazed alternately from the first or middle of May until December; buildings erected, or a gin-house altered to serve the cows; cisterns for water, and tanks for liquid manure, to be applied to the grass land kept for the scythe. The subdivisions may be effectively and cheaply made by means of the Cherokee rose.

For the planting and cultivation of this plant, see Nos. 1 and 2 of vol. 5, of DeBows' Review. When a good pasture of Bermuda grass is kept ungrazed, in the fall, so that the grass grows to a height of six or eight inches, the early frosts do not injure it so far as to prevent cattle from getting a good bite until mid-winter. Clover, or Egyptian oats, or rye, sowed in September, may be grazed after Christmas; at intervals, the oats until the 1st of April; the clover until June. If soiling were practiced, all the liquid manure saved in tanks, diluted and applied to Bermuda meadows, clover, peas, drilled corn, &c., from watering carts, the improvement of the land would be rapid and the yield of fodder immense. It is almost impossible for a cotton planter to carry on anything of this kind. It could only be done to advantage on a regular dairy farm.

Horses and Mules are now bred in considerable numbers in some parts of the country, and many of them splendid animals. The business is found to be profitable, and does not in the least interfere with the cultivation of either sugar or cotton. Animals bred here are much more hardy and durable than those brought down the river.

It seems unaccountable that planters in Mississippi do not set determinately to work to render themselves independent of their neighbors for the supply of an item so costly. If they were even to purchase yearling mules from the breeders in Tennessee, Kentucky, Illinois, Indiana, Missouri, and bring them south at that age, they would find the business still more profitable than it has long proved to be to the graziers of those States, who regularly buy up the young stock from the breeders. They are bought when weaned at from $20 to $30; the cost of transportation by steam would be less at that age than when grown, not exceeding $5 per head, including feed and insurance when a number are shipped at once; the cost of keeping on a plantation for two years would scarcely be felt; whilst the mules would be worth in reality, one half more than if brought south at three years old. Some planters breed the largest sized "cane-tackeys," as they are called, or native ponies of Spanish origin, to well-bred but small stout horses; thus producing a stock of tough serviceable animals, almost as durable as mules.

Mules vary in price from $70 to $125. Horses from $50 to $300. Cane-tackeys, good stout ponies of 12 to 14 hands, from $20 to $50.

Horned Cattle.—I have no means of answering your inquiry as to the number in our State. It is immense, however, and especially in the interior. The principal markets are New Orleans and Mobile, with the smaller towns in the State. A large number are annually *consumed* in the teams from the state of the roads during the hauling season, the carelessness of planters and overseers, and the cruelty and rascality of negroes—who often drive their beasts for days with scarcely any feed, reserving what was given them for use on the road to sell for their own benefit.

The native stock of the country, the large brick-colored or brown oxen, with their singularly twisted ram-like horns, are an excellent breed, making noble teams and fattening readily. Some of the cows, too, are fair milkers. Herefords, Durhams and Ayrshires, have been introduced in considerable numbers and at great expense; but from various causes, have done but little good; the Durhams least of all. Some of their crosses on good native stock are fine animals.

The average price received by the breeder for three-year old unbroken steers, sold to the butcher or drover, is from $6 to $15, according to condition and locality, and at these prices they pay pretty well. Good well-broke teams are worth per yoke from $35 to $60. Cost of keep, I have no means of estimating, nor is it ever taken into consideration.

Sheep Husbandry is a subject of decided interest to this State. It would, however, require a volume to answer the questions propounded as they should be answered.

Mr. Randall, in his letters to Mr. Allston, has accumulated a mass of information greatly encouraging to those who have the desire to engage in this business in the South, lacking, however, much that experience in a Southern clime alone can give. I will only remark that the short and fine-wooled families of sheep do well, whilst the long-wooled do not. I am not aware of a single instance in the South-west in which Cotswolds or Bakewells have done more than to exist for a year or two. Some of their crosses upon the shorter-wooled kinds have done better.

The Southdowns succeed admirably, and have greatly improved the mutton of the country, so far as *fatness* is concerned; as to fineness and flavor, doubtful. The Merino, Saxony, and Saxony-Merino thrive well, and in my opinion improve in quantity and quality of wool.

The improvement effected by a first cross upon our native ewes is great and uniform, both in wool and mutton. I have a small flock of very superior animals, Saxony and Merino, brought South four years ago. During the first two years they throve very badly, and increased slowly. Now, however, they do well and breed freely. I have compared the wool carefully, each clip, and think I see a marked improvement in fineness and softness. As yet I am not prepared to say more. Few planters keep more sheep than enough to supply their own tables with that most excellent dish, a saddle of Mississippi mutton, which compares favorably with the mountain

mutton of Scotland and Wales. They suffer at times severely from dogs.

Hogs.—The queries under this head must also be passed over, for reasons similar to those given above. Many planters raise an ample supply of hogs for their families, black and white. Many more find it a thing impossible, from the destruction of their young stock by the negroes, who have all a particular *penchant* for roast pig, and especially when stolen; and many never make the attempt to raise pork.

Rain.—Herewith you will receive an almanac, in which is a table of the temperature, quantity of rain, &c., which I condensed from the register of the late Dr. Tooley, of Natchez, published in Silliman's Journal.

Labor, its Cost, &c.—Negroes hire out readily at $15 per month for common out-door labor; the owner clothing them, paying physicians' bills, if any, taxes, &c.; the employer boarding them. When hired by the year on plantations, which is rarely done, the employer pays about $70 to $75 for a full hand, paying all expenses, in sickness and in health, unless perhaps taxes, and supporting the children if any.

White laborers, when making levees, canals, ditches, &c., receive $1 per day and board with *quan. suf.* of whisky. Few owners will put their negroes at such work in the swamps, mainly on account of its unhealthiness. At work in the mills they have from $10 to $15 per month, and board. Carpenters $30 to $50. Gardeners from $20 to $50. Overseers $250 to $800, according to number of hands on the place, and the experience and competency of the overseer.

The number who have gone, or are going to California, has somewhat raised the wages of overseers. Intelligent young men from the North and West, who are pretty good farmers, would find employment in this capacity; being content with moderate wages for a couple of years, under the eye of experienced planters on their home places.

Tar and Turpentine.—In the almanac already referred to, you will find all the information I possess on this subject. A number are engaged in the business and find it very profitable. There is great natural wealth locked up in Mississippi, from the want of a complete survey and report, geological, agricultural and economical.

Plaster and other Fertilizers.—During 1842, '43, and '44, I tried repeated experiments with red clover, sowing at various times, but mostly in the winter and spring. The result was invariably the same; so soon as warm, dry weather set in, the plants, though previously making a fine growth *on a good soil*, began to wilt as the day advanced, and by evening were entirely wilted down. By the first of August, scarcely a plant was to be seen, except in the fence corners and around stumps. In September, 1845, I broke up about an acre, consisting of three or four sharp and steep points of *very poor land*, with hollows between, of *good rich soil*. The hollows had been thickets of brier; upon the points scarcely even a stalk of broom-sedge or of poverty-grass could exist. I sowed the whole immediately with red clover, giving the poor portions a powdering of *plaster*, so soon as the seed had sprouted, at the rate of 1½ bushels per acre. During the fall and winter, the clover grew vigorously, showing little difference between the points and the hollows.

As the spring advanced, the plastered portions assumed a deeper green, never flagging a leaf during a very dry time. This induced me to have a bushel of plaster cast over the whole, the poor land thus receiving a more than double portion. After the very first shower, the effect was manifest and great. The clover on the whole of the lot grew vigorously through the summer, *the poor land keeping the lead.* I cut the whole over for soiling and for hay, when in full bloom about the first of June, I think, getting a heavy cut. It grew out again vigorously, bloomed and ripened a fall crop of seed, and, with the exception of a few straggling plants, died down, roots and all. About the middle of September, the seeds sprouted, and by the middle of October, the lot was as green as ever. It now got another bushel and a half of plaster over the whole. The weeds and briers had been kept down. By the middle of May it was a rich sight, the clover standing fully as high as the knee of a tall man, and covering the ground thickly and evenly, *but most so on the richer land.* It was again cut, the clover being removed only from the richer spots. On the rest, it was evenly spread and left as a top-dressing. The second crop was much better than the first upon the ridges, showing distinctly the effects of the top-dressing. The whole was cut *when in blossom*, and made into hay, *which salivated everything that ate it,* horses, mules and cows, and was ultimately used for bedding. The first crop did not produce this effect. The second crop salivated even hogs, turned upon it to graze. The third year the clover was not so good, still yielding fair crops, however, of which the first was made into hay, and the second ploughed in when at its best. Last year it was in corn, without manure of any kind, and was 50 per cent. better than on similar land, differently treated. Even the poor ridges have a full crop of large, well-filled ears. This year I am appropriating it to a permanent layering-ground for evergreens, being within the limits of my nursery. It faces the north.

The results of other experiments, upon land of different degrees of richness, and with every exposure, have been the same; proving distinctly that red clover can be grown as successfully here as in New York or Maryland, when *manured with plaster;* that the plant becomes here almost an annual, but few continuing to live after going to seed in the fall, and these being weakly when compared with seedlings. Of many neighbors who saw the results of these experiments, and had the matter explained to them, but one has followed them up, and *that a lady!*

With the cow-pea in all of its varieties, with vetches, tares, lentils, the different garden beans, young locust, acacias, &c., white clover, the results are equally marked. By the application of from 1½ to 3 bushels of ground plaster to the acre, a heavy cover of peas can be produced upon the poorest lands of this region. The peas ploughed in and followed by clover, or Egyptian oats and clover, and then fed off in the spring to be followed by peas, also to be eaten down by hogs and sheep, sowed again with clover in the fall, to be carefully turned under in the spring, will renew any land.

Wherever plaster is applied to land not utterly worn out, a thick cover is produced of white clover, or of a rank-growing species of *medicago* or snail-clover with a small yellow blossom, relished only by cows and some mules. The white clover salivates every kind of stock so dreadfully that I look on it as a pest.

I have also applied plaster to Bermuda-grass and to corn, but not with the same effect as that produced on clover, &c., still decidedly beneficial.

I have procured the plaster used partly in New Orleans, at from $1 25 to $1 75 per cask of about 6 bushels, the freight and drayage being another dollar; and partly from the makers of soda water.

Eight years ago I picked up some crystals of pure sulphate of lime, in

the form known to geologists as *selenite,* near Clinton, in this State; they were exposed in excavating for the Vicksburg and Jackson railroad. On farther investigation, I found it in considerable abundance, and have no doubt that an ample supply could be there obtained. I enclose you a specimen. About the same time, I pointed out extensive and inexhaustible beds of marl, in many parts of this district, the existence of which was hitherto denied here. I have used it to some extent and with marked advantage. Herewith you have a specimen, which please hand to my friend Dr. Gale for analysis, the result of which I should be glad you would add in a note. From a partial analysis made, it is rich in carbonate, phosphate and sulphate of lime; its effect upon the land is decidedly mechanical and chemical; making it friable and easy to work, and retentive of moisture; whilst it furnishes much that our soil and subsoil require of inorganic matter. It would occupy too much time and space to specify the results of different experiments. Suffice it to say, that in her vast beds of rich marl, Mississippi possesses a means of improving all of her worn-out lands that are not already too much gullied ever to be reclaimed.

Swamp-muck, leaf mould from the woods, horns, hoofs and bones, the last broken to pieces with a sledge and used in that state, and also dissolved by means of sulphuric acid, as directed by Prof. Johnston, the offal of the slaughter-house, and the bodies of animals, ashes leached and unleached, sawdust and spent tan-bark, cotton-seed, &c. &c., I use to as great an extent as in my power, and with the same good results so often stated.

Guano, upon many plants; the result upon a part of the sweet potato crop this season was most marked. The soil thin, worn, yellow clay; the potato variety *yam;* the guano at the rate of about a bushel per acre mixed with an equal measure of plaster sown along the ridges, the plough immediately following; the result, *a less growth of vine,* with more than double the quantity of potatoes, and these all large and fine.

Lime, only used as first related in the shape of marl, or of sulphate of lime and on fruit trees, as will presently be stated.

Orchards.—No portion of the Union is blessed with a soil or climate more favorable to the production of fine fruit than this and most other parts of these Southern States. An opposite opinion has unquestionably, but most erroneously, been entertained. There have been many failures certainly, but from very obvious causes; whilst many, the writer being of the number, have succeeded in ultimately overcoming the difficulties to be contended with, and in producing fair crops of fine fruit, apples and pears included.

The greatest impediment to success has been *the want of acclimated or naturalized trees* to begin with. Of peaches, such were to be had, native seedlings many of them decidedly fine. But for apples and pears, the sole resources were the nurseries in the Northern States and in Europe.

The subject of the acclimation of plants has been one of long and earnest dispute among the learned. As to their theories, they are of no moment; the facts are these:—

Every planter knows that if the corn in the crib be likely to prove short he may secure a supply, at least six weeks before his main crop will ripen, by planting a few acres of *boat corn,* that is, corn the production of a more northern climate, most commonly of Ohio or Kentucky.

That the yield, though earlier ripe, will be lighter than if he had planted

seed grown here, that if the second year he plants of the produce of his *boat corn,* the plant will be *later, stouter* and *more productive,* though not so early by some weeks as the year before, and that a third or a fourth year identifies it with southern corn. We may add the singular fact, that our native or southern corn will stand uninjured by a late spring frost, which shall cut to the ground and utterly destroy the plant from northern seed, growing in alternate rows!

The fact is notorious, that though garden seeds of northern growth will generally give us earlier vegetables, snap beans become stringy, squashes hard, cucumbers ripen, lettuce and cabbage go to seed, &c., much sooner than when from southern seed.

With roses and other shrubs, it is necessary to get a new growth *from the root,* entirely new wood, before they will flourish or thrive well.

And so it is with fruit trees.—The wood grown in a cold climate is adapted to that climate—to a cold long winter, and a short summer. When such trees are brought here, even if received in good order, which is a rare circumstance, they may grow off with some appearance of vigor for a time; but when warm weather has set fairly in, they begin to suffer; the leaves look dry and shriveled up; the tree is with difficulty kept alive by wrapping the stem and branches with moss, by mulching and watering, but soon, most commonly by the middle of July, every leaf has dropped and the tree either dies outright, or lives to make a faint attempt at a second year's growth. Occasionally, when headed well back, that is, the branches shortened, or the stem cut down to within a short distance of the bud or graft, and treated as just mentioned, they may live and grow, and ultimately bear fruit, but sparingly.

In the mean time, by budding upon vigorous native stocks, one step towards acclimation is made. In no instance have I found *an old stem,* wood of even one year, overcome the effects of the change of climate, and make a thrifty, vigorous fruitful tree.

Of three hundred varieties of apples, two hundred of pears, thirty of cherries, forty of plums, and now in cultivation here at Ingleside, fully one half will ultimately overcome the effects of change of climate and become naturalized. Every means is being employed to bring about so desirable an end.

Pears, which seem to adapt themselves of all fruits the most readily to our climate, are being grown upon several varieties of the quince, some upon their roots or upon seedling pears; and others, such as the seckel, on apple stocks; or the St. Michael, on the French Doucin apple.

Of apples, some are worked in the usual way on seedlings; others on their own roots, and on the Paradise or Doucin apple. The cherry thus far grows vigorously, the leaves persisting until frost on the mahaleb or perfumed cherry. The *monstreuse de Negel* and several others promise fruit next season, and so of other fruits. The quince as a stock for the pear, the Paradise and the Doucin for the apple, and the *cerasus mahaleb* for the cherry, all have the same effect; that of dwarfing, and causing early maturity and fruitfulness.

My experience leads me to state emphatically, and that of hundreds of others will bear me out, that success in fruit-growing, thus far south, need not be expected where reliance is placed on individual trees of northern growth, though, by perseverance and some degree of skill, most of the finest northern and European *fruits* may be successfully naturalized.

Another important item to be considered, in growing fruit thus far south, is the protection of the stem and main branches of the tree, and the shading of the soil around the roots from the powerful rays of the sun; to be properly effected by training the trees with a low head, and, at the same time, encouraging a thrifty growth; thus insuring an ample foliage. All trees seek to protect themselves in this way; and especially those with a smooth, glossy bark, which is so well calculated to absorb the heat of the sun's rays.

The bark of an apple, pear, or peach-tree, upon which the bright sun of this climate has been pouring his rays, through a long summer day, is *hot* to the touch, and even the sap will be found, on applying the tongue, to be of an equally high temperature. How can healthy, unblemished fruit be expected under such circumstances?

It is of more importance here than in a cooler climate, that the point of junction between the stock and scion or bud be *at* or near the ground. The causes need not be stated—to every nurseryman they will be obvious.

Overgrown, forced trees, produced by very rich soil or heavy manuring, do not suit a southern climate, nor, in fact, are they anywhere equal to those of a moderate growth.

Especially are they objectionable for planting out on the poorest hill lands of the south. In such a location, trees which have been grown on rich land *starve* and burn out directly, even if well manured, whilst thrifty trees of moderate growth, whose shoots are short-jointed and well ripened, scarce receive a check.

The difficulties referred to in procuring acclimated trees of pears and apples, have led to the almost exclusive cultivation of the peach, which though occasionally produced of the highest excellence and in great abundance, is an uncertain crop; not only so, but as a fruit for market, they are altogether inferior to the apple and especially the pear.

Great care is requisite to carry them in safety to New Orleans; the more, as freestone peaches alone are saleable in that market, whilst an accidental delay of a day or two entails an entire loss. The pear and the apple, on the other hand, very rarely fail of a good crop; may not only be carried to New Orleans in perfect safety, and in good order, but will suffer no injury from a detention of several days; and their season extends through some months earlier and later than the peach.

As it is my intention to give to the world, in a few months, a familiar treatise embracing the entire *gardens and orchards in the South*, I shall not extend these remarks much farther.

The low lands of the Mississippi, where dry or properly drained, are admirably adapted to the growth of the pear; and more especially when worked upon those free-growing varieties of the quince used for this purpose.

It has been stated that the fall and winter varieties of the apple, those that are such in a northern climate, are worthless here. This is altogether a mistake, and has arisen from a misunderstanding of the matter. Although the summer and early fall sorts are most profitable and uniformly productive here, the latter kinds are almost equally so, but ripen at too early a period to keep well, or in fact to keep for any great length of time after they ripen, say more than a month or six weeks; and, indeed, I have found that the later the period of ripening the more difficulty in acclimation. Still many late fall and winter fruits, the Newtown pippins, for instance, produce

and thrive well, and by preservance I hope in a few years to succeed equally well with a great proportion of the finest kinds. Ripening, as all the sorts do, long before they can be brought down the river, they command high prices.

Lime is an absolutely indispensable ingredient in the soil in which fruit trees of any kind are grown, and especially the apple and pear.

Until I was convinced of this fact, I found great difficulty in producing a healthy and vigorous growth upon many varieties of the apple. By *marling*, I removed the difficulty; the wood became short-jointed and healthy, the foliage abundant and persisting until frost, and the fruit large, sound, and free from specks or blemishes, such as before disfigured some kinds.

On grapes and the making of wine, it is unnecessary to say more than reiterate the statements of Dr. Weller, of North Carolina, relative to the incalculable value of the *white Scuppernong* to these Southern States for this purpose, and for the table.

It succeeds fully as well here as in North Carolina, whilst the fruit is decidedly larger and the juice richer.

It is a native grape, bearing the same relation to the muscadine of the woods that the Newtown pippin does to a crab-apple.

I have thus endeavored to answer your several queries as fully as possible, at the same time condensing as much as practicable.

I am, dear sir,

Yours with respect and esteem,

THOMAS AFFLECK.

Hon. Thos. Ewbank,
Commissioner of Patents.

Near Manchac P. O., Parish of Iberville, La., *Oct. 8th*, 1849.

Sir:—Your circular in regard to agricultural statistics came duly to hand, and with pleasure I contribute my mite to advance your laudable design.

Situated as I am, 15 miles below Baton Rouge, on the borders of the Mississippi River, makes it about the centre of the sugar region of this State; consequently we may be considered in the fullest sense a planting people; depending on one article (sugar) for our profits and revenue; and I shall confine myself to that article, with the incidental products for our own consumption, that we grow for the reason that it is better to grow than to buy.

Sugar.—The average product of the State, I would say, was about 1,000 lbs. and forty gallons of molasses to the acre.

A new process of cultivation that has now been in practice a number of years is planting the rows from 6 to 10 feet apart, instead of from 3 to 5, as was the former plan. The advantage of the wide drills over the narrow is that it gives the plant air and sun, enabling it to mature on strong land, and even on new land just brought into cultivation from the forest, and insuring a good quality of sugar from it. Under the old process of narrow drills, no planter thought of putting land in cane until it had been planted some 8 or 10 years in corn, so as to temper it down to that point by cultivation, and burning off the litter in the spring, so that the cane would not grow too large to mature sufficiently to make sugar.

But a few years back it was a universal custom to burn off the cane fields before we commenced ploughing, which was absolutely necessary in the narrow planting, to be able to plough, as the quantity of litter from the

cane crop, even after the matured part is taken off for the mill, exceeds any other crop that is grown.

It has now become very common, and rapidly growing into favor with the most successful planters, to bury all the litter with the plough in the middle of the rows as early after the sugar crop is taken off as possible, giving time to decompose before the finishing cultivation of the succeeding crop.

I would here remark that western purchasers of sugar have told me that the sugar made in the Rillieux apparatus has grown in great disfavor with consumers in the West and South-west, from its decomposition of grain, after standing late in the season, causing it to have an unpleasant smell, and being deficient in strength; that is, taking a much larger quantity to sweeten a cup of coffee than of common brown sugar made in the ordinary way in open kettles.

Several enterprising planters on the highlands of this State are erecting this year very costly apparatus, with the fullest confidence of success in making fine sugars and enhanced profits. The success of which, as with all other enterprises of this kind, I consider veiled in futurity.

Varieties of Cane cultivated.—The Creole and Otaheite canes have long given way to the ribbon in this State. Two varieties of the latter are almost universally in favor here, as best adapted to our soil and climate. The striped ribbon cane grows the largest, and is most esteemed for old lands, while the red or violet ribbon cane is most in favor for strong or new land, from its not growing so large as the striped and thought to mature earlier.

Disease of Cane.—The opinion is seriously entertained by many of our most intelligent planters that a disease similar in its consequences to that which caused the whole cotton-growing region of the U. S. to abandon the black seed cotton, from 1820 to 1827, is beginning to affect sugar-cane.

For the last three years, great complaints have been made in regard to the loss of seed cane. More than the ordinary loss was experienced in the planting of the crop of 1847, which caused more than usual care and attention in mattrassing the seed cane that autumn; but with all the care and skill, it was found that when the planting season came a still larger proportion of the seed cane was damaged than the year before, and that, although the bud or eye of the cane was dead, the cane was plump and sound, except showing black or decaying specks around the joints. This led to still greater care in putting up the seed cane in the autumn of 1848, but to no avail, as in many instances entire mattrasses were wholly unfit for planting, as not one in a hundred eyes was sound. I am credibly informed by many planters that for the last month or more they can perceive the same appearance on the joints of the cane now growing and apparently healthy.

This *Ribbon* was introduced into this State from 1820 to 1825, but I have as yet been unable to learn with precision whence it was imported. Feeling convinced that the present stock of cane here is becoming seriously diseased, or "*run out,*" I imported two hhds. of seed cane from Cuba last winter. I however did not succeed in getting the ribbon cane, as I desired and ordered. It was invoiced "crystaline;" a very large proportion of the eyes of this cane had been rubbed off by the rolling of the casks, no doubt in the shipping and reshipping of it. (It should be packed in square boxes, not too large for two men to carry.) What came up of this "crystaline" is of fine size, very healthy and vigorous, and has matured or sweetened well; though it is now sufficiently matured to determine its color, I fear it will turn out to be, what we occasionally find in both varieties of the ribbon cane, a *bastard cane*, so called, always remaining of a light dun or dirty-white color, and which is considered too delicate for this climate.

Cost of making Sugar.—I estimate the cost of making sugar in this State at 4 cents per lb.

The expenses incurred on the sugar, of charges, freight, commissions, weighings, storage, &c., paid by the planter, amount to ⅜th of a cent per lb., and about 3 cents per gallon on molasses.

I would here suggest that the sugar interest of the South might be greatly benefited by the government, through our consuls in the sugar-growing countries, by procuring and distributing among the most enterprising planters new varieties of cane calculated to supply the place of our own diseased stock.

Our consuls resident in cane-growing countries, enjoying as they do facilities for observation and for procuring information, might effect what it would be almost impossible for private enterprise to accomplish.

Maize (Indian Corn).—Next to sugar our most important crop is Indian corn. For the old stubble land the Spanish or creole corn is most esteemed, as it appears to be much hardier than the common white gourd-seed; it is a hard yellow flint corn, too hard for stock in its natural state; the stalk is much larger than any other variety, produces more fodder, is slower of maturity, and consequently less injured by excess of seasons, moisture or dryness than any other corn.

The tendency of all corn in this country is to become more flinty or harder. The continued cultivation of the soft gourd-seed corn from the western States will here produce a hard flint corn in the course of a dozen years, the cob increasing in size as it becomes flinty.

The average crop in stubble land is about 20 bushels to the acre, in new land, or that not exhausted by corn, the average is forty. Fifty-six pounds is the legal weight of a bushel of corn in our State.

Cow-Pea.—The next crop in importance to corn, to the sugar planter, is the cow-pea, both as a restorative to exhausted cane land, and as provender to the numerous teams necessary to the cultivation of a sugar estate. Hay made of the pea-vine when in full bearing, but before the peas have reached maturity, is esteemed by most practical planters far more valuable than either blades or shucks.

Peas are universally drilled or sown broadcast in the corn-fields at the last ploughing; and as a rotation, appear better adapted to the successful preparation of old land for cane than anything that can be sown.

After the stubble of exhausted cane land is ploughed up, which is generally every fourth year, one year in corn well set with peas will enable the land to produce three successive crops of cane of good size, provided the whole of the peas together with the stalks of the corn are turned in by a deep ploughing early in winter before making the next planting of cane.

I have no doubt this rotation of one planting of cane, and the two succeeding years of rattoons, with the litter from the cane ploughed in as described, and alternated every fourth year with the corn and peas, will forever maintain the alluvial lands of the Mississippi fully equal to the successful production of sugar.

Crab-Grass Hay is also an important item with the sugar planter, on the numerous roads of a sugar estate. Between the "laying by" of the crop of cane and the rolling season, it grows luxuriantly, and to sufficient maturity to make most excellent hay, fully equal to the best fodder from cornstalks.

The sweet and Irish potatoes, turnips, pumpkins, melons of all kinds, as well as all kitchen vegetables, grow here with little trouble.

Orchards.—Apples, pears, peaches, oranges, figs, pomegranates, pecans, and other fruits and nuts, grow here to great perfection.

Our dairies and poultry yards with little care, furnish an abundance of their products for the use of the respective plantations.

Yours respectfully,

J. N. BROWN.

Hon. Thos. Ewbank,
Com'r of Patents.

Lisbon, Union Co., Arkansas, *November 28th*, 1849.

Dear Sir:—Having received a copy of the circular inquiring for agricultural and other information, I submit the following observations relating to cotton culture, which you will use as your judgment may direct.

The location of this county is in latitude 32° 18′—long. 15° 30′. Cotton is the most important product of this portion of the State. The crop will necessarily be short this year, in consequence of the unusual late frost in the spring, the devastations of a small insect, vulgarly called "lice," and the very heavy and constant rains from the first of June until August The crop of cotton was also materially injured by the boll-worm. The quality of the present crop will be ordinarily good, which is owing to the very favorable fall for picking. The average yield per acre will be 450 lbs. seed cotton. What will be the amount of the crop for '49 is very doubtful; yet it is certain to fall much short of the average production since the settlement of this country, but in consequence of the much more land planted in cotton, it is probable that the export will be as heavy as it ever has been. The average production since the settlement of this portion of Arkansas, excepting '48—'49, is about 800 lbs. per acre. The export from the State last year was 188,000 bales, as now published, and no doubt generally correct. The soil of this section is a light, loose loam, in which the *oxide of iron* in some, and *sand* in other places, predominates. This is based on very thick, tenacious substratum. The country abounds in chalybeate springs of every possible strength; and is very humid, especially throughout the spring and summer. In consequence of the solid substratum of clay, the land receives kindly manures of nearly every description.

Cotton-seed is the only manure much used, and the methods practiced are various, yet they all agree in their ultimate result, which is essential in the use of this as a fertilizer, viz: the decomposition of the seed. My method, which I prefer after trying the different plans, is to keep my seed sound until used. For cotton, I open a furrow with a small plough in February, and sow the seed down in the track and cover it with a turn-plough, two furrows, one from each side; afterwards in the spring I bed out the land, throwing on the ridge containing the seed, over which I plant my cotton. Land of middling quality will yield one-third more by being manured with cotton-seed, and 15 bushels per acre is generally enough. If more is put on the land, and it should be dry, the crop will be materially injured, but if wet it will bear more without injury.

There are several varieties of cotton cultivated here. The *Petite-gulph*, the *acclimated Mexican*, and the *Prolific* and *Bunch* cottons. The Bunch

and Prolific are preferred by those who have tried them. There are more varieties, and I cannot with certainty give their history. But I am satisfied that they are produced by a mixture of seeds grown upon different soils and in different latitudes.

The method of cultivating cotton differs in the various soils. The principle always to be kept in mind in preparing land for cotton is to prevent an undue amount of moisture in stiff lands; and, on the other hand, in sandy soils, to guard against a want of this necessary element in vegetation. Therefore, high beds in the former, and almost none in the latter, will bring most favorably to bear the three essential conditions of rapid vegetation, heat, moisture, and light. The more rapid the growth of the cotton plant in spring, and the quicker it matures, the greater the yield. Upon well-managed cotton plantations, making a support of corn, meat, &c., 4 bales of 500 lbs. each per hand is a fair average. The average price of cotton for eight or ten years past may be set down at 6 cents per pound. Therefore, 2000 lbs. at 6 cts. will amount to $120 00

Expenses on 4 bales,			
Freight, ...	$4 00		
Commissions, 2½ per ct., . .	3 00		
Bagging and rope, . . .	7 00		
Storage, drayage, and weighage, .	75		
Insurance, fire, and river, . .	1 50		
		$16 25	
Expenses per hand,			
Clothing and taxes, . . .	14 50		
Ten per ct. on mule and horse capital,	10 00		
Wear and tear of farming utensils, .	5 00		
		$29 50	
Expenses of making the 4 bales, ...			$45 75
Clear profit per hand, ...			$74 25

This calculation is a fair average gain per hand throughout this locality.

I have learned from experience that much is lost to the cotton planter from having the cotton rows too wide, and the stalks too near in the drill. I find 3 feet by 4, one stalk in a hill, will form more regular limbs all around the plant, will bear more, make their fruit earlier, bolls larger, and staple better matured—and it is, besides, thus easier cultivated with the hoe, and the yield considerably above the average already given. A single cotto plant, well cultivated, at proper distance, will yield ½ lb. seed cotton. As over 3600 hills, 3 feet by 4 will stand upon an acre, the produce must necessarily be much above the common yield. Farms here are generally badly cultivated, from over-cropping, and want of proper manuring.

Very respectfully,

D. R. COULTER.

Hon. Thomas Ewbank,
Commissioner of Patents.

Memphis, Tennessee, *November 6th*, 1849.

Sir:—We submit the following remarks in regard to this portion of the State of Tennessee in reply to the various inquiries in your circular:—

Wheat.—This grain is not extensively cultivated in this section, though it grows well, yielding, without manure, about 15 bushels per acre. The *Red May* is the variety best suited to our climate, ripening the last days in May. Our driest soils are considered best adapted to this grain. The growing crop is subject to no disasters or enemies, except storms and rust; but the weevils often destroy the grain before it can be well prepared for grinding.

Oats.—Next to Indian corn, this is our most valuable food for stock—and the culture is increasing with us, not only from its value as food, but also because it furnishes fine pastures after the grain has been taken off, keeps down noxious weeds and briers, and is made and secured with but little labor. The common *Black* and *White*, and the *Ruffled* oats, are the varieties principally cultivated. The latter generally has the preference, because it ripens a few days later (10th to 15th July), which suits the time of a cotton planter better than an earlier harvest. Average yield from 25 to 30 bushels per acre.

Indian Corn.—With us this may be regarded as the "king of grains." It constitutes the chief food of every animal, from man down to the marauding rat, while its dried blade furnishes us with seven-tenths of the long food for our working animals. The *Large White* is the variety most esteemed, and most generally cultivated, for the reasons that it yields more grain and fodder, makes, when ground into meal, whiter and sweeter bread, and is less liable to injury from the weevils. The blade is usually esteemed the best long food for horses, exceeding in price the best northern hay; the average price may be stated at about 70 cents per cwt. The shuck is fed to cows and young mules, which they eat, but with less relish than they do the blades, which are sweeter and more nutritious. The former are much used for mattresses, being preferred to moss, as they are cleaner and easier manufactured. When mixed with coarse cotton, and properly prepared, they will make a mattress but little inferior to curled hair—price about 50 cents per cwt. The average price of this grain may be set down at 40 cents per bushel; and the yield on upland in this part of the State may be stated at about 30 bushels per acre.

Rice.—Of this grain but little is cultivated, though it grows and matures well. The only planter of our county who has given it his attention was the late Col. Andrew Rembert, under whose management it was a profitable crop.

The cost of raising the several mentioned grains may be stated as follows:—Corn 30 cts. per bushel—wheat 40 cts.—oats 15 cts.

Peas.—This crop is cultivated for food for man and animals, and also for enriching or improving the land; for the latter purpose, being considered equal to clover. Cotton flourishes after a full crop of pea-vines as if planted on virgin soil. Many planters esteem peas almost equal to corn for rearing and fattening stock. Black peas are most esteemed for stock, because they remain in the fields without rotting all winter; and when cultivated with oats, will give a fine crop after the oats have been taken off—provided the field be not pastured. They are often planted among corn, and receive a *working*, as it is called by the last ploughing given the corn, and yielding from 7 to 10 bushels per acre. Considering the labor required and the condition in which the field is left, this is, perhaps, the most valuable crop grown at the South. Usual price one dollar per bushel.

Cotton.—This is the great staple of all that portion of our State whose geographical position slopes to the south-west, comprising that section of Tennessee whose waters flow towards the Mississippi. The cultivation of cotton engages the chief care of every planter, and is the main source of wealth. From the constant and long-continued working of the soil necessary to produce a good crop, together with the fact that nearly everything produced is removed from the land, this is one of the most rapid exhausters of the soil that has ever engaged the attention of the agriculturist. The average yield to the hand employed in its culture would not exceed 1,500 pounds of baled cotton. With us but little attention has been paid to manuring cotton fields, and 6 cents per pound is as low as cotton can be made in any part of this State. Although we are on the extreme northern verge of the cotton region, we are authorized in saying that nowhere else has there been more laudable emulation amongst planters to improve the quality of our favorite staple, and send the finest samples to the New Orleans market. Indeed, it has been conceded by the brokers in that market that the county of Shelby is entitled to the high praise of having surpassed any other portion of the south-west in the exhibition of the finest premium samples.

The inquiry at once arises, to what cause is this alleged superiority to be attributed? Consistently with long-established opinion, we cannot ascribe it to superiority of climate. Yet the experience of the last year has demonstrated beyond dispute that the climate which is most favorable to a prolific crop is not necessarily most congenial to the production of the finest staple. For though we do not pretend to rival the more southern portion of the cotton region in production per acre, we can most successfully vie with them in the quality of our staple, as well as in all the mechanical appliances in preparing the crop for market. In comparing the average annual production of our lands, say 700 lbs. per acre, with the exaggerated estimates of an abundant crop in more southern latitudes, the odds would seem to be against us; but when we make a proper deduction for the ravages of the caterpillar, the worm, the rot, and equinoctial storms that prevail almost every year in a warm climate, we very much doubt if the advantages of a comparatively northern temperature, in exempting us from these calamities, do not render the culture of the plant as profitable here as anywhere else. The amount of merchantable cotton that will be shipped from Memphis this season is estimated at 150,000 bales—embracing the crop of six or eight counties, and the average product of the crop in this portion of the cotton region will compare advantageously with any other quarter we have heard from.

Horses and Mules.—Many of both are raised in this State, and of very superior quality. Horses for the saddle and harness, and mules for the plough, the wagon and the dray. Many are sent every year to supply the wants of our more southern neighbors in Mississippi, Louisiana, Georgia and Alabama.

Of *Horned Cattle*, we only raise an abundant supply for home use.

Of *Sheep*, while the middle portion of our State contains some as fine flocks as there are on the continent, we have but few, and these of poor and common breeds, receiving but little attention, being allowed to roam over the fields and woodland pastures, choosing their own lodgings and providing their own food. And as many of us are descendants of the constituents of Col. Macon (partaking by inheritance of his social as well as political peculiarities), who owned *thirteen dogs himself,* and allowed to each of his

negroes *at least one*, about half of our flocks are annually killed by dogs.

In conclusion, we are pleased to report for your information that the manufacturing spirit is beginning to develop itself here; enterprising efforts are making to diversify the employment of a portion of the labor and capital of the county, by the erection of a cotton factory, a merchants' flour mill, and a bagging factory, in our city. These establishments have long been needed here, and will prove powerful agents in developing the natural resources of the country. No other expense has fallen so heavily on the cotton planter for the last few years as the unreasonable price he has had to pay for the article of bagging. And it is a matter of surprise that the value of this enterprise, and the investment of capital to supply this great demand in the South, should alone be understood in the States of Kentucky and Missouri. The central position of our city to the commerce of the whole South and West, by which it commands a flourishing trade with the interior of an extensive back country, must necessarily present great inducements for the investment of manufacturing capital. The aggregate exports of this city at the close of the business season, consisting of cotton, corn, live-stock, &c., will amount to $7,500,000.

Very respectfully,

JOHN POPE,
SAMUEL BOND.

Hon. Thomas Ewbank,
Commissioner of Patents.

Sugar Grove, *Licking County, Ohio, Sept. 25th*, 1849.

Sir:—I have received one of your circulars, seeking practical information on agriculture, and things in connection therewith.

I feel diffident in putting forth my experience on a subject in which many have spent much more time, with perhaps much better opportunities for investigation than myself; but will on a few points of agriculture, in which I am particularly engaged, say a little, of which you will of course make such use as seems best.

1st. *Wheat.*—I have in the last three years cultivated six kinds of winter wheat on upland, second bottom, and first bottom. I have sowed the different kinds in such location, and cultivated them in such a manner (frequently two or three varieties in the same field), as to give me the best opportunity of judging of the comparative value of each.

I have been more successful with the *Mediterranean* than any other—it stands the winter better, is less subject to injury by the fly, ripens one week earlier than any other, and two weeks earlier than some; thereby escaping the worst effects of the rust. It is the heaviest of any one crop, weighing 65 lbs. (60 lbs. being the established weight for a bushel of wheat); it has, one year with another, produced the most bushels to the acre. I think from all I can learn that it is much the best variety for this locality; other kinds may succeed in some places better. Our principal enemy has been the Hessian fly. I understand the midge, too, has done much damage a few miles west of here the past season. The rust is the only disease that has much injured the wheat in this country this year; hundreds of acres have been nearly ruined by it; I think the *Mediterranean* is the only kind that has all been harvested. I have not known any of that being left standing as not worth the labor of harvesting. My own experience is in favor of upland light clay soil, as far the most sure; but occasionally the bottom lands produce excellent crops.

I prefer to enrich my wheat lands by pasturing with sheep. The application of manure, if made, I think should be well-rotted compost, or barn-yard manure, long manure tending to produce too much straw.—My time of sowing, from the 20th of September to 10th of October; average crop for the three past years, 18 bushels per acre. I prefer to plough well once, and but once, even on sod land. Cost of cultivation per acre, including seed, $5 75. Wheat has twice within the last 16 years been injured by late frosts in the spring. Those kinds which are the most forward would undoubtedly suffer the most from this cause.

Indian Corn.—I esteem this a very important production in this part of Ohio; our corn is mostly of a mixed character; I have used for several years the *yellow gourd-seed* principally, and esteem it the best for this latitude; larger and later kinds may perhaps succeed further south. It ripens about early enough, and produces a good-sized ear with deep kernels, tolerably easy masticated when fed in the shuck to cattle, and easily shelled when fed to hogs in the ear. It produces more shelled corn to the given amount of ears than any other I have grown, and weighs when clean 56 lbs. to the bushel; that being our standard weight. We have several kinds of flint corn, all of which ripen a little earlier than this; and we have the *white gourd-seed*, and some others that are later. There can, I think, be no doubt but all the varieties of corn, with good cultivation, gradually, but steadily, in good seasons advance to the standard best adapted to the particular climate where it is grown; and I think I can discover in my experience (which is short), that the corn of central Ohio has a tendency to modify itself from the coarse large gourd-seed, on the one hand, with deep dented kernels, and the hard flint of the north with smooth short kernels to a medium between, which will produce eventually, with good management, the corn best adapted to this locality. I esteem the shuck or husk, if used immediately after the ear has been taken from it, as worth more pound for pound than the blade, and both together, deducting the stalk, when well preserved, as worth more for horned cattle than the best of hay, weight for weight. I this season mixed two kinds of seed together to try the effect it would have.

I have had little experience in feeding ground or cooked food to stock, and would prefer for common feeding, where labor is as high as it is here, and grain as cheap, to feed my corn to cattle from the shuck, and to hogs in the ear, and ground with rye to horses. Corn with us has as many enemies, if not as deadly ones, as wheat. In the spring the ground mole, the cut worm, and various kinds of beasts and birds; in the summer the grub worm, the last a very serious enemy, which has destroyed much corn in these parts the last few years, and for which I know of no remedy, but should be extremely glad to find one. The others, even to the ground mole, may be prevented by soaking the corn in a solution of copperas, and putting tar upon it, and then rolling it in lime before planting. There is a disease that has made its appearance within the last few years that has not been noticed by writers, or if so, has escaped my observation. I am not aware that it has affected the ear perceptibly; I will call it the blight. It seems to strike the leaves, and they turn black more suddenly than if affected by a hard frost. It seems as yet to be confined to the lower leaves,

and I think comes on in extremely warm weather. I had a field of ten acres last summer about the 25th of August, where nearly all the leaves below the car, and some above, became black, and I have noticed some fields somewhat affected this season. I am of the opinion that the influence is atmospheric, and have some fears that if it continues it may prove quite injurious to corn, by destroying much of the fodder, and preventing the kernel obtaining its full size. The cost of growing an acre of corn, and putting it in the shuck exclusive of the use of the land, is about $6 75. My own average 60 bushels; average of the county 30 per acre.

Hay.—I esteem mixed hay as more valuable for feeding any kind of stock, than either clover or timothy, but we are under the necessity of using those kinds of grass best adapted to the land on which it is to be grown.

Sheep Husbandry.—Merino, and a mixture of Merino and Saxon, are the kinds most raised in this vicinity. The condition of this branch of industry is flourishing. The clip of the county last spring was about half a million lbs.; average price obtained, 26 cents per pound. The weight of the fleeces of our best Merinos would average about 3 lbs.; those that have more Saxon blood, 2½. Many flocks of common or native sheep will yield about the same as the others. My own observation is that less depends on the fineness of the wool than the management and keeping of the flock. I have a flock of between three and four hundred, about ¾ blood Merinos; my average clip for the last four years is about 3¼ lbs. I estimate the cost of keeping sheep at one dollar per year per head. Our wool is principally sold to the manufacturers of the New England States and their agents, who generally call upon the wool-growers at their homes, and purchase their wool. Some lots are sent East to the wool depôts and commission merchants.

Labor.—The cost of labor is about one hundred and thirty dollars per year and board. Cost of boarding, five dollars per month.

Grape Vines flourish in this region, but few kinds of the grape mature well, except the vines are fastened to walls of brick or stone, in which case the most approved kinds succeed tolerably well. I have had no experience in the manufacture of wine; central Ohio will be found too far north to favor the cultivation of the grape for that purpose—but with suitable care, enough may be raised for table use.

Sugar.—I have a grove of two hundred and fifty sugar trees, from which I make on an average one hundred gallons of molasses, which sells readily at 75 cts. per gallon. The seasons are so variable that it renders the business extremely uncertain. I think the cost of making maple sugar cannot be on an average less than ten cents per pound. I have, however, in some seasons, made it at an expense of five cents per pound.

Very respectfully yours,

WM. S. WRIGHT.

Hon. THOMAS EWBANK,
Comm'r. of Patents.

OAKLAND FARM, NEAR SPRINGFIELD, CLARK CO., *Nov. 6th,* 1849.

DEAR SIR:—It is with much diffidence that I attempt to answer the queries you have sent me, but my experience, so far as it goes, you shall have freely.

First in importance and first on the circular is *wheat.* We have some ten or twelve varieties, of which only 3 or 4 are under names known out of the neighborhood. That in most general favor from its productiveness and early maturity is the *Mediterranean.* This has a large berry with thick dark bran, and weighs from 60 to 66 lbs. per bushel. It has improved in quality of late years, and with care in grinding makes a very fine quality of flour. The *old red-chaff bearded* is fast getting out of favor from its failure within five years, though never considered very productive; yet it withstood the fly, frost, and rust better than other varieties. Usual weight from 58 to 60 lbs. with good crops. The *Wabash* is a bald wheat, very thin white bran, stands well, grows well in low and rich ground, not much raised from its lateness in ripening, and not more than one crop in three is first rate. Weighs 56 to 60 lbs.

Yellow lamb—bald, a beautiful and productive wheat when it fills well—very liable to smut. Average weight 60 lbs.

Shot Wheat.—A variety lately introduced here from a neighboring county, under what I suppose is a local name, but denoting well its peculiar plump character. Ripens about the same time with Mediterranean; bearded; a stiff straw; a fine, round, red berry, and will yield nearly equal to the above; usual weight 60 to 62 lbs.

Other varieties are raised in different sections, where they are favorites.

I hear of no spring wheat being raised in the south-western part of this State.

The only serious enemy we have to contend with is the Hessian fly, and that has not troubled us much for the last two years.

The weevil has been very troublesome in some parts of the State, but I have not yet seen any signs of it here.

The rust is its most serious disease, and indeed a severe check to the cultivation of this grain. This year, from the estimates made, there will not be one-third the usual average crop in this State, which will be but little more than is required for seed and bread for the next year. In regard to changes in character, I find a marked difference in quality when raised on different soils, and experienced millers say that they can make from one to two pounds more flour from wheat raised on upland ground, than that from black bottom soil. We consider the medium between the high and low lands, on what is termed here *second bottom,* the best soil for this crop. I suppose the best wheat lands would be found in the south-eastern part of the State. Not one acre in ten of this crop has any manure applied. A summer fallow or corn ground, after that crop is taken off, is the usual custom, and sometimes two, or even three crops in succession, upon the same land. The common mode of using manure, is to put it on fallow ground and plough it in, when the grain is sown. The straw is very little valued, and often buried in the field, and is seldom taken into account as food for stock. Fourteen bushels, I think, would be the full average crop for this and the surrounding counties. This is also probably near the average of the State. The standard weight of wheat regulated by law is 60 lbs.

Oats.—This is considered a secondary crop in this part of the State. The varieties cultivated are the *common dwarf,* the *side oats* and the *Tartarian.* The first is not so productive as the other two, but stands up best through our summer storms. The second is most productive, but grows tall and is very liable to fall. The third is a new variety, introduced within a few years; it is liked, so far as known, from its stiff straw and large-sized

berry. The straw, from its softness, is preserved as food for stock. This grain is generally considered about ⅘ths the value of corn as food for stock, but is preferred for horses when the price ranges in the above proportion. Oats is a common forerunner of wheat, in which crop its deleterious effect upon the soil is shown disadvantageously. The standard weight of oats is 33 lbs.

Rye.—There are two varieties cultivated, designated as the *white* and *black rye*. It is principally sown on low rich soil which will not produce good wheat, and is quite a certain crop, yielding from 20 to 25 bushels per acre; but, from the low price it bears in proportion to wheat, it is not much raised. It is nearly all consumed in distilling, and but a small part ground for bread. Near towns, the straw is expected to pay the expense of threshing by hand.

Barley.—No new varieties of this grain have been introduced. Those in cultivation are the winter and common six-row. The first makes the heaviest grain, and yields from 25 to 40 bushels per acre. The second kind is mostly cultivated and most productive, though difficult to get in early enough in the spring to insure a good crop. The soil in this section seems to suit it very well. But little is used except for malting.

Maize.—There are numberless varieties of this grain in cultivation, mostly crosses between the *gourd-seed* and *small flint*. Our summers are not long enough for the first, but a large and later variety than the latter is preferred for this climate. We find by experience that this grain soon becomes acclimated, but by so doing it loses its character, either becoming larger or smaller, as the case may be. With good cultivation, our medium lands will produce from 50 to 75 bushels per acre, without the assistance of manures, but the average for the county will not exceed 40 bushels. It is generally ripe enough to cut up by the 15th or 20th of September. Our uplands produce the heaviest grain, though the bottoms yield larger stalks and ears. I have never seen any experiment to estimate the comparative value of the husk and blade, but have observed that sheep, if they have plenty, will often refuse the husk entirely, while cattle will eat the husks first, and then the blades. I have never tested their value in comparison with hay, but the common impression is that the same weight of blades, if gathered and cured in a proper manner, is more desirable for young stock or horses than the average quality of hay. Our pastures are too extensive in this country for much to be done in soiling, and I know of but few instances where it is followed. At the large milk establishment near Cincinnati, corn is considered the best plant for that purpose. We find that ground corn well repays the extra expense; and the profit of cooking is illustrated every day at our distilleries, where, after the process of distilling, the refuse is found to be equal to the grain in its raw state. The standard weight is 56 pounds. Our upland corn often overweighs, while that raised on black bottom land seldom exceeds 56 lbs. per bushel.

Hay.—We generally consider clover best for cattle, and timothy for horses; but most of our hay is mixed. Clover is chiefly raised for pasture or as a fertilizer, and timothy only raised pure when intended for market. Herds-grass and timothy are the common mixture for our natural meadows, where the first forms a solid turf and eradicates the natural grasses, and by feeding stock upon this, or heavy harrowing and sowing, timothy is introduced. The average of pure timothy per acre, I should say, does not exceed 25 to 30 hundred. I know of no experiments in irrigation having been made upon a large scale.

Peas are not cultivated to any extent in this part of the State. I think from experiments made that they are equal to corn for hogs, but horses and cattle will not eat them.

Root Crops.—Irish potatoes have always succeeded very well here, until within 2 or 3 years, since which time they have suffered much with the rot. The average in field culture does not much exceed 100 bushels per acre. The sweet potato requires a warmer soil and climate than we have here to succeed well. Turnips are made very uncertain by the fly and warm dry weather, at the proper time of sowing; they are not considered a regular crop, and very seldom fed to stock. Beets, carrots, mangold-wurtzel, artichokes, &c., are not raised as food for stock; and from an experiment with sugar-beets, where labor is so high and other fodder so cheap, they did not pay me for the expense of raising, and since then I have abandoned the culture of them.

Dairy Husbandry is not carried to any extent in this county, and your queries in regard to this I am unable to answer.

Horses and Mules.—Of the number in the State, I have not data from which to give an estimate. The average price of working horses with us I would give as high as $50, and of mules over three years old $60 to $65. Very few mules are used in farming, from the general objection to their peculiar qualifications, though they are undoubtedly cheaper than horses.

The market for mules for the last few years has been in the South. That for our horses, of which large numbers are driven off, is in the East.

We have heavy dealers in *Cattle* here. At three years old of common stock, they generally range from 15 to 20 dollars per head; if improved from $30 to $40.

Our cattle are driven to the eastern part of New York and Pennsylvania. Six dollars per annum is the usual estimate for feeding from 1 to 3 years old. The Durhams seem to be the favorites here, of which we have some very fine specimens, principally descended from the Scioto importations.

Sheep.—Wool-growing is quite a considerable branch of industry in this part of the State, there having been as much as 90,000 lbs. of wool bought in our county town, and the clip of the county ranges from 75 to 80,000 lbs. per annum. Upon the common stock of the county has been crossed the Merino and Saxony, so that nearly all flocks show connection with these breeds.

The fleeces range from $2\frac{1}{4}$ lbs. on the Merino, and Saxony to 5 and 6 lbs.; on the large coarse sheep of the country, but 3 to $3\frac{1}{2}$ lbs. is considered a very fair yield. The expenses of keeping sheep to those who arrange to have good winter pastures is very inconsiderable, only requiring food when the ground is covered with snow. Where regularly fed the expense is about 50 cents per head.

Hogs.—The average weight of hogs at 20 months or 2 years old, I should put down from 175 to 200 lbs. net. Fat hogs will lose about 20 per cent. of their live weight when dressed, and are no profit to the farmer near a market for this grain, under $2 50 per 100 lbs.

Excuse any mistakes in this report, as my experience in farming is not of many years standing; and I would be glad, if this gives satisfaction, at any time to serve the department in this way.

Yours truly,

J. MORRISON WARDER.

Hon. THOMAS EWBANK,
Com'r of Patents.

PLYMOUTH, WAYNE CO., MICH., *December 27th*, 1849.

SIR:—Your circulars have been received through the care of the Hon. R. M'Clelland, and Hon. A. W. Buell, and will be most cheerfully answered from the best information derived from inquiry and personal observation. As the culture of wheat constitutes the main agricultural business of Michigan, a few ideas may be advanced which are applicable thereto. Three important things in relation to it may first be considered, viz., climate, soil, and cultivation. A temperate climate is most conducive to its production; in extremely warm or cold regions it does not mature as well.

Clay, loam, and sand may be considered our principal soils, and a due mixture of these forms a fine ground for wheat.

In addition to these, *marl* and *alluvial* matter may occasionally be found in Michigan, and the soil is generally well charged with alkali, and lime gravel. On the *cultivation* of wheat much depends. The prudent farmer analyzes the quality of his soil by the best means within his reach, and should any of the elements be wanting, he endeavors as much as possible to supply the deficiency.

His low lands are drained and ridged, that the surplus water may pass off. The ridges should not exceed fifteen feet in width. On these lands there is usually a large growth of straw, but not so much wheat in proportion as on the more elevated lands. Those low grounds are generally considered best adapted to corn, oats, and grass; and the drainage contributes much to the healthiness of such locations. The lands of Michigan are usually undulating, and require but little draining.

The practice lately adopted of ploughing but once for a crop saves much labor in cultivation. By this method the vegetable substances which are to form the nourishment of the coming crop are turned under to a reasonable depth, and rolled down compactly, so that decomposition readily takes place. The process after rolling is to harrow the field over, using, if it can be obtained, the wheat cultivator, guaged so as not to turn up the furrow. Thus the land is prepared in fine order for the crop. The cultivator used by me is "Ide's Patent," manufactured in Western New York.

By this mode of culture, the nitrous substances do not escape by evaporation, as they did under the old soil-destroying system of ploughing a second and third time. To the above method I add the frequent use of clover, lime and plaster, of which my experience of nearly thirty years testifies the advantages, both in improving the land and the quantity and quality of the crops.

Among the many varieties in use, I prefer for seed the white, and almost transparent flint wheat. It is the most hardy kind, and being a bald wheat is easy to work with should it lodge. It fills well, does not shell much in harvesting, and will stand out in the open shock in stormy weather much longer than any other variety without injury. It is heavier per bushel, makes better flour, and generally yields more to the acre under the varied circumstances to which the wheat plant is subjected, than any other kind.

During the past twenty years, the average weight of my flint wheat has ranged from sixty to sixty-five pounds, and the yield has varied from fifteen to forty bushels per acre, depending on the soil, cultivation, and season.

My mode of preparing the seed is to place the given quantity on the barn floor, after being perfectly cleaned, the day before seeding, and saturate it well with a strong brine of salt and water, and on the day of seeding I wet

it again with brine, and roll it in equal parts of lime and plaster, and then sow at the rate of two bushels to the acre.

The time of seeding for the past thirty years has been from the 15th to the 25th of September, and my wheat has never suffered materially either from rust or the insect. Preparing the seed in this way gives the plant a fine growth in the fall, and a strong root to withstand the winter. It likewise has an early growth, so that the rust is not so apt to strike it. As the insect makes its appearance about the 20th of September, the wheat does not come up, when sown as above stated, until after the fly or insect has disappeared. It is a mistaken idea entertained by some farmers, that *shrunk* wheat is equally as good to sow as the plump berry. On the contrary, the seed should always be of the best kind, for it is a law of nature that *like produces like*, which is as true in the vegetable as the animal kingdom.

Our wheat crop is harvested from the 10th to the 25th of July. There is but little difference in the time of ripening of the following varieties, all of which are cultivated more or less in this section, viz., the velvet-bearded, the red-chaff bald, the crate, the club wheat, which has a remarkably stiff straw, the red-chaff bearded, the Mediterranean, which is not liable to be injured by the insect, the white-chaff bald, a very tender kind of wheat, with a brown berry, and very apt to shrink, the dwarf flint, the large white flint, and the transparent or crystal flint.

My practice in the application of manures is to put all the stable and straw manure on the *corn* and *oat lands*, where the weeds can be subdued; and the clover, plaster and lime upon the wheat fields, which are fallowed. A judicious system of rotation is also very beneficial, which must be regulated according to the best practical observation, varying the process according to the nature of the soil, the quantity of manure, and the help at hand, all of which should be taken into consideration. The cost of raising wheat will not vary materially from the estimates contained in the communications from me published in the Reports for 1847 and '48.

The aggregate crop of 1849 throughout this State compared with that of the previous year is a trifle higher, including the additional land now under cultivation.

Oats.—The oat crop is not considered a very profitable one by many of the farmers of Michigan; there are the following varieties produced: The small white oat, the mane or side oat, the barley oat, and the black oat. The two last-named varieties are usually preferred by farmers, and with me the black oat yields the best. When sown in April they generally ripen in August, depending somewhat upon the season. The weight of a bushel of oats by the statute is 32 pounds; and of corn 56 pounds. For feeding stock, or fattening hogs, the value of oats is much less than corn. One bushel of corn, ground and cooked, is worth more than a bushel and three pecks of oats prepared in the same manner. There is not this difference when fed to horses; as corn is rather too heavy and heating for them. A mixture of ground oats and corn, two bushels of oats to one of corn, wet with cut hay, or rye straw, makes an admirable feed for horses.

The cultivation of oats is becoming less popular, as it is thought to injure the soil for other crops.

Rye is not extensively grown in Michigan, from the fact that more wheat can be produced from the same field, and is a cash article, while the demand

for rye is limited. No new varieties have, to my knowledge, been introduced into the State.

Corn.—The *dent* variety in dry seasons produces the best on sandy loam, as its roots run deeper than the common *eight-rowed* yellow or white. In moist seasons, the latter varieties usually do well. They are grown more generally in the northern part of the State, while in the southern section the Ohio dent is principally raised. The shuck and blade are much used as fodder for cattle, in the early part of winter.

Corn is very liable to change of character from soil and climate, growing smaller the farther North it is raised. The mixing of the *eight-rowed yellow* with the *Ohio dent* has, so far as my experience goes, been beneficial in increasing the yield. Sandy loam or clay is considered the soil best adapted to corn. We usually plant in May, and harvest in September. The blade is not taken off here as at the South; some farmers cut up their corn when ripe, put it into shocks, and husk it late in the fall; others cut the stalks, bind them in sheaves, and stack them for winter in the fields, or put them away in barns or sheds; while others husk the corn on the hill without cutting the stalks, and late in the fall turn their cattle into the field to eat the fodder. Of these different modes, the preference is usually given to cutting the stalks and putting them under cover after being well cured, and husking the corn on the hill. The corn is thought to ripen better in this way, and to keep better in the crib. The *Ohio dent*, having a smaller ear containing less moisture than other varieties, ripens quicker and keeps better.

The following estimates of the cost of raising the above crops will not vary far from the average in our new State, where the grubs and roots have first to be subdued, before the land will be fitted for any new or improved method of ploughing and cultivating.

The cost of new land and preparing it for the crop is about ten dollars per acre.

Wheat.

Interest on land, $10 per acre—2 years,	$1 20
Ploughing and sowing,	4 00
Seed, 1½ bushels per acre,	1 20
Harvesting,	1 50
Threshing, cleaning, and marketing,	1 50
Cost of crop per acre, averaging 18 bushels,	$9 40
Cost per bushel, about	52 cts.

Corn.

Interest on land,	60
Ploughing and harrowing,	1 50
Furrowing, planting, seed and plaster,	1 50
Cultivating, hoeing, &c.,	2 00
Harvesting, shelling, and securing fodder,	2 25
Cost of crop per acre, averaging 40 bushels,	$7 85
Cost per bushel, about	19½ cts.

(The fodder will pay for marketing.)

Oats.

Interest on land,	60
Ploughing per acre,	1 50
Seed, 2 bushels,	50
Sowing and harrowing,	50
Husking, threshing, and marketing,	2 00
Cost of crop averaging 35 bushels,	$5 10
Cost per bushel, about,	14½ cts.

Potatoes.—The crop this season is better than it has been for 3 years past, although it has suffered somewhat from the disease. About the 20th of August, the first appearance of disease was observed on the vines, the tender leaves of which seemed to be stung by a small fly or bug, and immediately wilted; the disease spreading quickly over the whole vine, and thence downward to the potato itself. I am satisfied that there is an insect that affects the potato vines, which is of recent origin, and somewhat similar to the wheat fly. A neighbor of mine prevented the spread of the disease over a part of his field by sprinkling slaked lime on the vines when the insect first appeared; he also rolled the seed potatoes in lime after having cut them to plant. I think that sprinkling lime on the tops, say one bushel to the acre, is a much better preventive to the disease than cutting off the vines, as is often done about the middle of August.

Hay.—Timothy is preferred to clover hay. *Red-top* and *blue-joint* are next best for cattle; but for all kinds of stock a mixture of timothy and clover is by far preferable. For enriching the land clover is very valuable; its long tap roots bring up from sub-soil many of the elements which will serve as food for the future crop. On the natural meadows and prairies of Michigan, there is an abundance of wild grass which is of incalculable benefit to the emigrant, furnishing pasture and hay for his stock. To the early settlers these prairies are more available than the wheat lands; providing them with milk, butter and cheese, and the means of fattening pork, beef and mutton. The average yield of wild hay is about one ton per acre.

Tame hay, so called, on timbered lands yields from one to two tons. The former is worth $2 to $3, and the latter $5 to $8 per ton.

Peas are cultivated both for enriching the land and for fattening hogs. We sow 2 or 3 bushels to the acre, and harvest them in August; and then plough the land once and put in wheat. In this way the land is as well fitted for wheat as if fallowed; but this plan is not generally followed, as many farmers prefer the corn to the pea crop.

Cattle and Horses are raised in all parts of the State. The price of 3 year old cattle varies from $10 to $15. We have the Devon, Durham, and Holderness, and the native breeds. The former sell much higher than the above prices. The cost of keeping on the prairies is but trifling. Our market has been at home to supply emigrants, until lately; now many are driven off and shipped to eastern cities. On new land oxen are principally used for breaking up, and sell at from $50 to $100 per yoke. Cows are worth from 10 to $20 each, and horses from $100 to $200 per pair.

Sheep.—The prevailing races are native, although many good flocks of Merino, Saxony, and lately of a superior breed, called *French all-wooled Merino*, have been introduced; the weight of the fleeces of the last-named breed is said to be 10 pounds; the common Merino 3 lbs.; the Saxony 2½

lbs., and the native from 3 to 4 lbs. The Leicester and Southdowns are a more hardy race, and make better mutton. Our State is well adapted to raising sheep, and increased attention is being paid to this branch of husbandry.

Orchards.—Great pains and care are taken to select fruit trees, such as apples, pears, peaches, &c., as fast as the land can be prepared for that purpose. With me the most successful method has been to dig a hole from four to six feet in diameter, and about two feet deep, and fill it half full of warm rich earth. I then wet the roots of the tree, set it and fill around as compactly as possible with the same rich soil. Wetting the roots of the tree causes the dirt to adhere more closely to them, and is better than pouring in water, which often makes the ground crack and admit the air. The orchard may be cultivated with corn or potatoes, but oats or clover should never be grown.

Above I have endeavored to give a few ideas as to the method and progress of agriculture in our young and growing State. If these hints shall be deemed worthy of an insertion, I shall consider it a privilege to add my mite to the useful reports of your office, which contain volumes of information of much practical value to the farmers of the country.

Respectfully your ob't serv't,

JONATHAN SHEARER.

Hon. Thomas Ewbank,
Comm'r of Patents.

Moscow, Hillsdale Co., Mich., *December 22d*, 1849.

Dear Sir:—Your circular calling for the statistics for 1849 was duly received and would have been answered before, had I not delayed to collect information from the assessor's returns for the county. My experience in the culture and raising of wheat is as follows. The *white flint* has proved to be the best variety. The *Soules*, *Hutchinson*, and *White Flint* do not vary much in time of ripening (about 8th July) or in weight. The *Mediterranean* wheat ripens about ten days earlier than the other varieties mentioned. The Hessian fly is the greatest enemy to the wheat crop in this section. The *Mediterranean* has been recommended to farmers as free from the ravages of this insect; but here it has proved otherwise—and this being coarse, dark-colored wheat, I do not consider it a valuable variety.

Our soil is well adapted to wheat, being a mixture of sand, gravel, and loam, highly impregnated with lime. In the course of the last nine years, from 1841 to '49 inclusive, I have cultivated fifteen hundred acres in wheat, which have produced twenty-two thousand five hundred bushels, an average of fifteen bushels per acre. The price at my barn has averaged seventy cents per bushel; the cost of raising forty-five cents, including interest on land estimated at ten dollars per acre.

Corn.—The *yellow dent* is esteemed the best variety for this soil and climate. The usual time of ripening is about the 1st of Sept. This crop ranges from 25 to 65 bushels per acre, and the difference in the yield is to be attributed to the manner of cultivation. My experience shows that a crop of 45 bushels per acre costs 18 cents a bushel, including interest on land. Corn is principally raised in this vicinity for home consumption, and the stalks and shucks, if well cured, are worth $8 per acre, compared with hay at $5 per ton. I consider green corn for soiling cattle and producing

milk preferable to any other green food at that season of the year. I have tried some experiments in feeding corn ground and cooked; and I consider *two* bushels ground equal to *three* fed whole; and for fattening hogs, if ground and cooked, it is worth double as much as if fed whole and raw.

Hay.—I think timothy hay is worth 50 per cent. more than clover for all stock; clover is better for horses and sheep than for cattle. I get a better crop of timothy by sowing clover with it; our soil is too quick and warm for timothy alone. The average yield in this vicinity is from one to one and a half tons per acre.

Root Crops.—Not much attention has been paid to the culture of these, except Irish potatoes, and they are only cultivated for home consumption. The quality is of the very best, and the average yield is about 150 bushels per acre. They have not been injured so much this year as last by the rot. I estimate about 15 per cent. as the loss from the disease this year.

Sugar.—The amount of maple sugar manufactured in this county the past year is 157,459 pounds. Allowing this county as the average throughout the State, the amount of sugar manufactured in this State will be over 4 millions of pounds during the past year.

Horned Cattle.—The whole number in the State will not vary much from 350,000. Average price at 3 years old $12. Markets, Ohio and New York. The cost of keeping per year $5 per head. In consequence of an inferior breed, and the little attention paid to improvement, the cost of keeping exceeds the market value. This loss in raising cattle will be turned into profit, when the farmers turn their attention to the improvement of the breed generally throughout the State. I find no difficulty in making my cattle worth, at the age above specified, $20 per head. There have been some few improved cattle lately introduced into different parts of the State, principally Durhams and Devons. I prefer the latter, and have a stock of pure-blooded Devons, which when crossed with our common breeds increase their value fifty per cent.

Sheep.—The prevailing race is the common coarse-wooled sheep; and the average weight of fleece of this grade is about 2½ lbs. Pure-blooded Merinos will yield about 3½lbs., and with extra care and keeping 4 lbs. I have a flock of one thousand, and find the Merino to be the most healthy and hardy of any breed. The pure *Escurial* I consider preferable to the *Paular*, or any other of the Merino race. Wool-growing in this State is rapidly increasing, and those who are giving it proper attention are reaping rich rewards, compared with those who confine themselves to the great staple, wheat. Prices of wool ranged last year from 25 to 35 cents per lb. Our markets are New York and the Eastern States. The cost of keeping per year is about sixty cents per head.

Hogs.—Average weight at 18 months old 250 lbs. When well fattened, deduct one-fifth from live weight to obtain the net. The cost of fattening, as most farmers do it on raw corn and in open yards, $3 per hundred weight. If the corn be ground and cooked, and there are good arrangements for feeding, at least 50 per cent. will be saved.

Plaster.—This is used sparingly in this part of the State; cost $10 to $12 per ton. It is very beneficial to clover and pastures; and I find from experience that 25 pounds per acre is worth as much for one year as a larger quantity. By sowing plaster as above, I have increased the crop of clover and timothy from ¾ of a ton to 2 tons per acre.

Orchards and Fruits.—We have many young orchards just beginning to

bear fruit. Much pains have been taken of late by our farmers to procure the best varieties. Peaches, plums and pears are cultivated with good success. Our fruit-growers have also given much attention to the grape. A neighbor of mine, Mr. O. C. Gale, has raised during the past season two bushels from a vine only three years old. This is the Catawba, a variety much esteemed by most people in this vicinity.

The statistics of this (Hillsdale) county, required by law to be taken by the assessors, are as follows:—

Wheat, number of bushels	207,000
" average " per acre	10
Wool, number of pounds	66,456
Maple sugar, number of pounds	157,459
Horses, number	4,713
Neat cattle, number	8,436
Swine, number	6,584
Sheep, number	24,321

If the above information will be of any benefit to you, or the agricultural interests of our country, I shall feel myself amply paid for the little time I have devoted to the subject in this communication.

With sentiments of high respect,

I remain yours,

O. B. BLACKMAR.

Hon. Thos. Ewbank,
Com'r of Patents.

ADRIAN, *Michigan*, *December*, 1849.

SIR:—Your circular was handed me some time ago, by Judge Potter, with a request that I would reply to such of its questions as I thought best.

My residence, until a few weeks past, has been in North-Western Ohio since 1830; my knowledge of that section is therefore greater than of Southern Michigan, my present residence.

I shall only touch those matters with which I am most familiar.

Labor.—The most common labor with board is worth from \$50 to \$75 a-year. A higher quality, in which some care and responsibility are added, is worth \$100 to \$120. When hired by the day 75 cents in summer, and 50 cents in winter, with board, is about the average; without board 20 cents should be added. The cost of boarding a laborer is from \$1 to \$1 50 per week. A large proportion of the laborers are German and Irish.

Plaster and other Fertilizers.—These are used to some extent, but much less than the interest of farmers require. I notice that about four times as much plaster was sent up the canal from Toledo this year, as went up last year. The quantity forwarded into the interior of Michigan by the rail-road from the same place, is also rapidly increasing.

The Onondaga plaster, shipped by way of Oswego, is principally used. It costs at Toledo and Monroe one dollar per barrel; equal to about 6 dollars per ton. I have used it on sand and clay land with decidedly beneficial results. When applied to grass, I have used leached ashes with it, putting on 100 bushels of ashes to one of plaster. This application, with a moderate supply of horse-dung, gave me crops on a light sandy soil that astonished all who knew the previous poor products of the same land. I took yearly, for 3 years in succession, three full crops of clover and timothy

from a soil far from naturally fertile, being of that kind known as yellow-sand. I have also used plaster on corn and potatoes with good results. For potatoes, I at first put on too much ashes, perhaps at the rate of 200 bushels to the acre.

There are beds of gypsum on Sandusky Bay and on Grand River, in Michigan. It is brought from both places to the ports along the lake, and many persons prefer the white Sandusky and Grand River to the Onondaga, which is gray. I have used both the Sandusky and the Onondaga, without being able to say which is best. Both are nearly enough the pure sulphate of lime.

In regard to common *lime*, very little use has been made of it as a fertilizer in North-Western Ohio and Southern Michigan. It enters so largely into the composition of the clay of all that region, and in many places of the loamy soils, that its application is scarcely needed. In considerable districts, where the top soil is a sandy loam, a sub-soil of clay so calcareous as to effervesce with acids is found a few inches below the surface. A sub-soil plough will generally bring enough marly clay to the surface to mix with the soil. This whole region is underlaid with lime rock, which crops out in many places.

On the cultivation of the vine, I have had a rather wide personal experience. Before 1820, I witnessed a growth of foreign grapes trained on small forest trees, in the ground of the lady of Gov. Milledge, of Augusta, Georgia.

These were said to do better than any which had been trained after the European fashion. From that time to the present, I have seen the failure in almost all the climates of our country, of all attempts to raise the foreign grape in the open air. For a short time the *Black Hambourg* and some other varieties bore good crops in the Southern States. Several gentlemen in South Carolina and Georgia spent much money and labor in efforts to make successful the cultivation of foreign grapes in vineyards. Mr. Herbemont, of Columbia, South Carolina, was particularly noted for his hopeful labors in that field. When I first saw his vineyard (in 1826) it contained some 15 acres, embracing a great variety of foreign grapes. The kind called by him *Sicily-Madeira* was, according to my recollection, the best bearer. Long experience finally satisfied Mr. H. that he must rely on the native grape for such crops as would be profitable for wine and the table. A similar experience has been gone through in Ohio and Indiana, with like results. Seedlings from foreign grapes, the *Isabella*, the *Catawba*, *Lenoir*, &c., have been cultivated with success. For 10 years I have cultivated a grape which proved to be the *Clinton* of New York; it was bought of a nurseryman for the Isabella. The two kinds have since been cultivated together. Of these, the Clinton has proved the more profitable; being a far more hardy vine, and an earlier bearer. Both kinds rotted a little last summer for the first time, but not enough to prevent the maturing of a heavy crop. The severe frost and ~~open~~ winter of this climate often occasion the destruction of the previous year's growth of the Isabella. The Clinton is never injured. The Clinton ripens a week earlier than the Isabella. I have tried neither kind for wine. Last autumn a friend took some of the Clinton from me to be made into wine, as an experiment; being less pulpy than the Isabella, it would turn out more juice. It is the impression that it will be the best wine grape of this climate.

The Catawba grows pretty well here, but is rather late in ripening. The

vine is more hardy than the Isabella, not being liable to be winter-killed to the same extent. On the Ohio river, it appears to be the best grape, both for wine and the table. I know of no reason why wine may not be made of the Catawba and Clinton grape in quantity equal to the home demand for ordinary wines. Both kinds grow with great luxuriance on rich soil; they appear to grow equally well on rich clays and sandy loams. Both are gross feeders and capable of bearing, without injury, very high manuring.

As a dried fruit, the Clinton grape is excellent; it requires little labor or care in drying. Last year we strung the bunches when ripe, and hung them up in a large garret, where they dried, after their own fashion, very well. In the spring we were delighted to find them the best dried fruit, both for eating uncooked, and for cooking, that we had any acquaintance with. This year we have used them for pie-making, and find them very good. We have put down both the Isabella and the Clinton in cotton-batting, and kept them fresh until February, in a cold garret. The Clinton appears to keep in that way better than the Isabella. It appears to me that dried grapes might be brought into extensive use, and be made to take the place of imported dried fruits, as the currant, &c. For fall and winter use, the grape is preserved fresh, about as easily as apples; they scarcely rot as much. Cotton is the best material to pack them in; a layer of cotton and a layer of grapes alternately—the bottom, sides and top of the cask being also well lined with cotton.

When eaten in January and February they were thought better than when taken just ripe from the vine.

As to the mode of training, I have used all with equal success. Vines should have room enough. They must not be pruned in European fashion. I believe they should have no summer pruning. They should be allowed to run extensively, when the root is large and in rich ground. I would allow them four or five times the extent which European cultivators recommend. The yearly pruning in February should be done with a bold knife. Beginners always leave too much of the last year's growth; I mean after the vines have attained sufficient length.

Mr. John S. Skinner, Maj. Adlum, Messrs. Herbemont, Longworth and others, deserve the lasting gratitude of the whole country for their efforts, finally approaching success, in promoting the cultivation of the vine.

That your labors to promote this and all other branches of industry, called for by the present condition of the country, may be crowned with success, and equally redound to your honor, and the benefit of the country, is the ardent desire of

Your ob't serv't,

J. W. SCOTT.

Hon. Thomas Ewbank,
Commissioner of Patents.

Prairie du Chien, Wisconsin, *Dec.* 3d, 1849.

Sir:—Your valuable report for the year 1848 having a few days since fallen into my hands, my attention was particularly called to the subject of planting, and the remarks as to the *time* of doing so in different sections of our extended country, together with the time of ripening, harvesting, &c. (page 108). Not noticing anything in reference to the country north of this place, and along the Mississippi and Lake Superior, a country with which I have been somewhat familiar for several years past, it occurred to me as possible that some account of this region would be acceptable if not desirable, relative to climate, crops, &c.

And *first* as to the season of planting Indian corn. In 1836, when I settled with my family at this place, Col., now Gen. Taylor, was in command of this post (Fort Crawford), and had for many years in addition to his military duties, attended somewhat to agriculture—not of course from necessity, but from his constitutional inclination to be doing something useful to the world and his fellow-men. His example no doubt contributed greatly towards improving the mode of cultivating the soil at this place, by the Canadian French who were then the only farmers here.

The Gen'l, as you know, was from Kentucky, where corn is planted in April, and of course would naturally think *that* the proper time to do so; but he informed me, as the result of his experience, I think some 15 years, that from the 10th to the 15th of May was early enough to avoid the late spring frosts, which usually come from the 15th to the 20th of that month; and in the 13 years of my residence here, I have found his views to be correct, and have even seen corn ripen which was planted on the first week in June.

As to other grains, spring wheat, oats, barley, peas, &c., they are often sown in April. Our winters here usually break up in March, and the plough is started by 20th of March, and from that to the first of April. We have had but one spring of the thirteen I have been here, when snow and ice would prevent ploughing by the 1st of April.

North of this, of course, the time of planting is proportionally later. In Minnesota, planting is often done as late as the 15th to the 20th of May, and even to the first week in June. In the spring of 1837, as a missionary to the Dakotah Indians, I planted corn on the 24th of May, some seven miles from Fort Snelling, and on the 1st of June, it was up two inches high, while in some of the ravines facing the north, the ice which had formed from springs to a considerable thickness, by overflowing, was still visible nearly opposite where St. Paul now stands; and as far north as Sandy Lake, Lake Superior, and the North Red River, Red Lake, Leech Lake, &c., the 1st of June would be sufficiently early for planting.

Secondly: You seem to infer from the lateness of the season of planting that there must be a corresponding lateness in ripening and harvesting. This however is a mistake, for two reasons:—

(1.) In this northern region we plant a kind of corn different from that grown farther South; a kind which matures sooner. The southern gourd-seed would not ripen here at all; every attempt to raise it has failed; nor do we use the New England 8-rowed flint corn. We use a kind peculiar to the country, which seems to have come from the gourd-seed by acclimation; having been removed by degrees to the north, and being affected by the seasons (of which I shall soon speak,) it has accommodated itself to the climate in which it grows. The kernel is less dented, about half as long, and the meal sweeter and more nutritious than the gourd-seed. The stalk is about half the height of the gourd-seed, the corn about the same length, and the cob about the same size; but the diameter of the ear is less, owing to the difference in the length of the kernel.

The corn raised near the northern lakes and rivers is of a still different kind; the seed of which was obtained from the Indians, who raise it in considerable quantities. This Indian corn seldom grows over 4 feet high; the ears

set near the ground, several on a stock, and are small. The kernel is sweet, and it matures in about 6 or 8 weeks from planting. I have had it on the table in six weeks after planting, as far south as this. This corn has frequently yielded 50 bushels to the acre.

The corn I speak of, as peculiar to this country, and as coming by degrees from the South, will probably average 50, and has sometimes yielded 70 to 90 bushels to the acre. One kind of it was from Kentucky, called *white hominy corn*, which was brought to this country and acclimated by the late Thomas P. Barnett, Esq., some 15 years since.

(2.) Another reason why our crops are not proportionably late in ripening, is the greater rapidity of the growth of vegetation as we go north. Nature seems to have provided for this; so that in latitudes where the seasons are short the growth of vegetation is the more rapid.

On the 27th of June, 1838, at the falls of St. Anthony, I saw corn in the tassel, and potatoes in the blow, while strawberries were at full maturity all over the plains. On the 4th July, of the same year, at the Little Falls, a few miles below, where Fort Gaines now stands, I also saw potatoes in bloom, while the wild grapes had attained their full height and were preparing to seed. About the middle of July, 1843, I saw wheat late sowed, ready for the sickle, at La Pointe, on Lake Superior, while potatoes and other garden vegetables were beginning to show themselves on the table. And about the 2d of July, 1840, I saw as large and fine-flavored potatoes on the table, at the mouth of St. Croix, as I ever eat, while the spring wheat and oats were being harvested.

Of the climate in this region of the country, you may form an opinion, from the fact that we have raised sweet potatoes of good size at this place; and a few years since I raised cotton from seed brought from New Orleans, in which the fibrous wool was perfect, but the seed did not ripen. Of the products of the country, we may say that our corn crops do not average equal to a more southern climate; but, in wheat, rye, oats, barley, peas, &c., we can hardly be beaten. One of my neighbors, Joseph Atherton, Esq., two years since, harvested 55 bushels of winter wheat from an acre. The year before, on less favorable ground, Judge Lockwood harvested 40 bushels per acre. Our average crop, however, is about 30 bushels of that kind of grain. I have seen a field that yielded 90 bushels of oats to the acre, though 60 is considered an average crop. Our winters here, in 43° N. latitude, are not more severe than in 41° in New England; and being less subject to change, are endured with much more comfort. We have had no snow since the 20th of March last, and no freezing yet to impede the out-door business of the country. But it is usual for our winters to set in about the 20th, to the 26th of November. When winter sets in, it usually increases in coldness gradually, till about the 20th of February, when the thermometer sinks to 24° below zero, and in a few instances to 30°, and in one case to 36°; but this only for a few days, when immediately after the winter breaks, and generally by the 20th of March the plough commences its operations.

Whether these facts will be new, or of any use to you, is for you to determine; if they are, you can make use of them at your pleasure. They would have been communicated sooner, but for the reason first stated, that it is but a few days since your Report for 1848 fell into my hands, and as you there intimated that you were obliged, under the existing laws, to wait till

the close of the year before you can make your annual report, I hope, if this is of any use, it will not be too late.

Respectfully, your ob't servant,

ALFRED BRUNSON.

Hon. Thomas Ewbank,

Comm'r of Patents.

Fond du Lac, Wisconsin, *Nov. 20th*, 1849.

Sir:—Your circular addressed to me as President of the State Agricultural Society of Wisconsin was duly received.

I am sorry that I cannot give you more information in reply to your pertinent and important inquiries, as I have not preserved the necessary statistics. I am glad these "circulars" have been issued to suggest to the country, as they have to me, the importance of doing so.

I could speak on several topics enumerated in the list of your inquiries; but it would be only to multiply words without instruction; I therefore forbear.

In regard to "sheep husbandry," I will say a few words, prefacing that I am more acquainted with this branch of business, and that I am a breeder of Paular-Merino sheep.

I will answer your inquiries under that head.

1. "What are the prevailing races?"

Answer.—Merino, Saxon, and native—not many pure or full-blood of either sort. The Merino predominate. The Saxon are not considered sufficiently hardy for our climate.

2d. "What is the condition of this branch of industry?"

Ans.—Just beginning to attend to it—of necessity farmers must get some few years' start with their improvements before it is proper or profitable to introduce sheep. It is just the time now for the farmers of Wisconsin to turn their attention to sheep, *and they know it.*

3d. "What is the amount of wool clipped in the year, and average weight of fleece of different races?"

Ans.—I cannot tell the amount of wool clipped in the year in this State. The "average weight" of the fleeces of the "races," *mixed as they are*, is between three and four pounds. My Paular-Merino bucks shear from nine to thirteen pounds—ewes five and six. I think a flock of Paular-Merino sheep may be made to average six pounds.

4th. "What is the cost of keeping sheep through the year per head?"

Ans.—The cost per head (exclusive of labor for tending and shearing) is about forty cents a year.

5th. "Where are your markets?"

Ans.—There are a few wool-buyers every year in the large towns on Lake Michigan; but most of the wool, I apprehend, from this State, is sent to Peters' Depot at Buffalo. This answers your other questions as to "system of selling," and in part answers the following:—

6th. "Have you wool depots, and are they found advantageous for the wool-grower and manufacturer?"

Ans.—I think that wool depots are of great advantage, both to the wool-grower and manufacturer, or at all events, that they may be made so. Doubtless some improvements may be made in the system. After all, it will be

liable to abuses; but it is the best, I think, at present devised, and, honestly and fairly carried out, may be made of great use to the country.

7th. "What number of sheep are killed by dogs in your State?"

Ans.—Dogs trouble us but very little in this State; and the same may be said in regard to wolves, which answers another inquiry that I have often heard made.

One word as to prices paid for wool. The wool that was purchased by buyers in this State was generally bought for about 25 cents per pound. I sent mine to Peters' wool depot at Buffalo, and it was sold for *thirty-six* (36) cents per pound; all except some of the finest quality, which brought sixty cents per pound. The expense of transportation was about fifty cents per hundred weight.

I will make another remark, as it bears upon the question of the utility of wool depots, as well as on the subject of our western markets.

Wool of the same quality as mine which brought thirty-six cents at the depot, that is, wool shorn from the flocks of sheep, from which my own sheep were selected, was sold in Vermont this year (not at a wool depot) for thirty-three cents per pound, and this tends to show another thing; to wit, that there is no foundation for the foolish notion entertained by some that the wool on sheep brought to the West will grow coarser if they remain here. In other words, it shows that we can raise fine wool in the West as well as anywhere.

Hoping that your forthcoming report may be of great use to the country,

I am, sir, very respectfully,

Your ob't servant,

ERASTUS W. DRURY.

Hon. Thomas Ewbank,

Com'r of Patents.

Washington, D. C., *November 15th*, 1849.

Sir:—In compliance with your request, I embrace the opportunity of giving you such general information as I am in possession of in relation to the productions and improvements of the Southern portion of Indiana and Illinois.

It will be impossible to furnish any reliable statistics of the exports. The most I can do, is to compare the present with former years, with a view of showing the excess or deficit.

The articles for exportation consist of corn, pork, wheat, flaxseed, tobacco, hay, flour, kiln-dried corn meal, buckwheat flour, whisky, potatoes, green and dried fruit, castor oil, beeswax, wool, cattle, horses and sheep.

The principal staples, however, are corn and pork. The average productions of which will be thirty per cent. over any former year. But two varieties of corn are cultivated to any extent, white and yellow. Pure yellow yields equal to any other, always finds a ready market, and commands better prices. The medium price is twenty cents per bushel, shelled and sacked, the purchaser furnishing the sacks. More cultivators fall short of 50 bushels per acre, than exceed that quantity.

The price of pork will vary from $1 50 to $2 50 per 100 lbs. net, depending upon the weight of the hog, 200 lbs. and upwards commanding $2 50 per 100 lbs., while under that size it will range as low as the minimum price. Oak mast has been unusually abundant, and a large quantity of pork

will be made without any attention from the owner; but mast-made pork is 25 per cent. below that made exclusively from corn.

Wheat is cultivated extensively, but is a very precarious crop. This year, as far north as the National road, it has almost entirely failed. A full average price is fifty cents per bushel for wheat weighing 60 lbs. the bushel measure.

Flax is raised to some extent by our farmers. It does not seem to be well adapted to our soil. Many cultivate it exclusively for the seed.

Tobacco is not an article of general culture. In a few counties it forms the main staple: the quality is excellent and the quantity exceeds that of last year.

There has been a failure of all kinds of fruit, particularly apples and peaches. Where apples sold last year for 10 cents per bushel, they now readily command from 50 to 75 cents.

All kinds of root crops are excellent. Potatoes, I believe, are exempt from disease, and have yielded 25 per cent. more than last year.

The hay crop, with the exception of clover, will be 50 per cent. below the growth of 1848. This is owing to the visitation of the army worm in the month of May, and the drouth which immediately succeeded.

Considerable kiln-dried corn meal was exported in 1848, but the returns have been unfavorable.

But little flour will be exported this year.

It would be difficult to estimate the quantity of whisky exported. The county of Perry alone manufactures 300,000 gallons, nearly all for the New Orleans market.

Castor oil is manufactured extensively at Albion, Edwards County, Illinois. Perhaps 100 bbls. would be a fair estimate of the quantity turned out yearly at that place.

The quantity of wool exported has greatly fallen off within a few years past. The climate and soil seem well adapted to wool growing.

Great numbers of horses are taken to the St. Louis and New Orleans markets from this part of the country; the principal objection to them is on the score of size; our farmers have too generally encouraged the breeding of light horses.

More attention has been given to rearing stock, and our farmers have taken considerable pains to improve the breed of cattle in Indiana and Illinois. Not a few have gone to the expense of importing from Europe the best animals to be had there. Large exports of beeves are made to New Orleans.

Emigration to this section of country is chiefly confined to the Germans, who are devoted to agricultural pursuits, of sober and industrious habits, and become valuable citizens.

They have introduced the culture of the grape in many of their settlements, two varieties of which are grown with success; the Catawba and Isabella. The former is esteemed the best bearer—it is a good table grape, and makes an excellent wine. I have known a net profit of $500 realized from half an acre of the Catawba, for table use.

Wherever the experiment has been made with the native vine, it has proved more lucrative than any other crop requiring the same space and labor.

A silk factory has been put in operation at New Harmony, Indiana, and

the fabrics from cocoons made there will compare favorably with the products of English looms.

The expense of transporting produce at any considerable distance from navigable streams, and the disproportion of prices when a few miles of overland transportation has to be made, have aroused our citizens to the importance and utility of internal improvements.

A plank road is now under contract from Mount Vernon to New Harmony, Indiana, a distance of fourteen miles; the estimates are about $1,800 per mile. Another is contemplated from Evansville to New Harmony, a distance of 26 miles, which will probably be put under contract in the spring. It is further proposed to extend this road across the State of Illinois to St. Louis, Mo. Wherever plank roads have been put in operation, they have proved profitable investments; indeed they pay better than any others, and are emphatically the roads for the farmer.

Respectfully yours,

LYMAN D. STICKNEY.

FRANKLIN CO., INDIANA, *Jan.* 12*th*, 1850.

Indian Corn is raised by almost every farmer, and by many in large quantities. More dependence is placed upon it as a source of revenue than upon any other one article; or indeed, I might with propriety say, than on wheat, oats, and barley, all combined.

A considerable quantity of the corn thus raised is consumed by distilleries, yet the larger portion by far is fed to hogs, which are principally driven to the Cincinnati markets. I presume the average yield of corn in this portion of Indiana will not vary much from thirty-five bushels per acre; and I should judge the average cost of raising about sixteen cents per bushel. The last year's crop will fall rather below an average crop, in my estimation.

Present price 25 cents per bushel at Brookville; at which place some thirty-five or forty thousand bushels have found a market within the last two months. Wheat comes in next to corn as a staple for market, yet the income arising from it falls far short of that from corn, and the crop is much more uncertain.

In the early settlement of the country, the farmers were reduced to the necessity of seeding among their corn, which at that time gave a reasonable reward for their labor; but as the land becomes reduced (as it naturally must by such management), the return for the farmer's labor must diminish; and until the practice of seeding among corn be done away with, the average quantity of wheat raised per acre must be low. I think that about 12 bushels may be set down as the average yield, and that at a cost of fifty cents per bushel. The wheat crop of last year proved almost an entire failure in many parts of Franklin and the adjoining counties, in consequence of the *rust*, which made its appearance some two weeks previous to the usual time of harvesting. Never within my recollection was the prospect more flattering for an abundant crop of wheat than it was until the appearance of the rust, which truly caused a great disappointment with the farmers.

Oats are raised in considerable quantities of late years, and form quite an article for market. It is considered by most persons a hard crop on land, yet notwithstanding that the quantity raised will increase materially.

My impression is that the oat crop of last year will hardly average with a few years previous; either in quantity or quality. Common average about 30 bushels per acre; and cost of raising, perhaps 15 cents per bushel.

Barley was grown a few years since by many of the farmers, and formed something of an article for market; but its culture is being neglected of late in this section of country, and the deficiency measurably supplied from other States. Spring barley mostly raised in Indiana, which at best is an uncertain crop; and it apparently becomes more so every year, which has been discouraging to the farmers, and almost caused its disappearance from amongst us.

Root Crops.—There is but little account made of root crops, except potatoes, which are cultivated by almost every farmer, in small quantities; designed chiefly for table use. Some few persons turn their attention to the culture of Irish potatoes for market, but I think they form a very limited article in the food of stock. In the early settlement of the country, the growth of almost everything put in the ground was luxuriant, which created the impression on the minds of the early settlers that the labor of removing manure was unnecessary. Some were seen removing their stables, rather than be at the expense and trouble of scattering the manure on their farms. It is natural to suppose many of the descendants of those early settlers inherited the impression of their ancestors; and to this day the great advantages resulting from the judicious application of all manures, which naturally accumulate on all farms, is almost lost sight of.

My impression is, that where land is cheap and labor high (as is the case here), it will not justify the expense that many of the New England farmers incur in manuring their lands; yet at the same time, our lands may be much improved by careful and proper management; and it should be the object of every farmer to apply all manures at his command on the poor portion of his farm, depending principally on *red clover* and *timothy* as fertilizers. I have both tested and witnessed the beneficial effects resulting from the cultivation of red clover. As a fertilizer, it is certainly ahead of any other kind of grass, leaving the ground in delightful order, either for corn or wheat, and, indeed, preparing it with that necessary to the growth of almost any crop. I am aware that strong prejudices exist in the minds of many persons against red clover, for two reasons: first, because the worms are so apt to destroy corn planted immediately after the clover crop; and second, because cattle frequently die when first turned on it in the spring.

In answer to the first objection, I would remark that for years I have been experimenting upon the subject, and have come to the conclusion that fall or winter ploughing is almost a sure antidote to the ravages of the worms. Some three years since, I made my arrangements to put two fields in corn, side by side; the one was in clover, and the other in timothy. I sought opportunity to plough my ground in the winter, but failed in my purpose, except to break up a narrow strip of dry land, which passed through the middle of each field. In the spring I prepared the balance of my ground, and planted it in corn; the result of which was, that portion of corn planted on the ground broken up in the spring was utterly destroyed; whilst the part planted on the ground which was ploughed in the winter remained unharmed.

I have also experimented some upon the subject of grazing cattle upon clover, which has been entirely safe and satisfactory to me. My experience has demonstrated that cattle should never be turned in the field without being well fed, nor before the dew is off in the morning, for a few of the first mornings; and moreover, that they should be removed from the field immediately after one or two of the first showers of rain, after they are turned on pasture.

Wages range from 10 to 13 dollars per month, and board on the farm; and hands are scarce at that.

Mechanics ask and receive from 1 to 2 dollars per day. There have been great improvements in the way of buildings, roads, canals, &c., which have brought up labor rather higher than the farmers can afford to pay.

Lumber is in demand, and commands from $1 to $1 25 per hundred at the mills. Principal kinds used, poplar, oak, walnut, ash, sweet gum, cherry, and beech.

Orchards.—In the early settlement of the country, the farmers had hard struggling to get along, without devoting much time to their orchards—consequently, nearly all the old orchards are seedling fruit, and that of a poor quality. The second planting of orchards contains much better selections of fruit; yet they have been much improved by ingrafting in the top, within 8 or 10 years.

For about the same length of time, great pains have been taken by many individuals to cultivate young orchards, selected with care, and of the choicest fruits. There was a very limited crop of fruit last year; apples are now worth from 50 cents to $1 per bushel in the principal markets.

Stock.—Very little taste is manifested in the selection of stock for the farms of this country. Some few persons have turned their attention to the improvement of stock; but as a general thing carelessness prevails to a great extent.

We have no *Agricultural Society* in this county; and I think the prospect very poor for an organization of that kind soon. I think there is much good done by means of agricultural societies, where they are properly conducted. I shall feel much pleased to give my feeble aid in sustaining one in this county.

Reclaiming wet Lands.—Within a few years, the people are waking up to their interest on the subject of under and open drains; some of the most productive farms of this county, at the early settlement of the country, were deemed almost valueless, in consequence of low marshy places, which continued covered with water until late in the spring. Drains have been constructed through many of these places, which have prepared the land, and made it susceptible of a high state of cultivation, and added threefold to its previous value.

I have constructed on my farm about one mile of open and under drains, and in each case I find them to more than meet my most sanguine expectations. Time and space forbid my entering into detail upon the mode of construction, and beneficial results arising from them.

Yours respectfully,

JOHN P. BRADY.

Hon. Thos. Ewbank,
Com'r of Patents.

La Porte, Indiana, *November 30th*, 1849.

Sir:—Although our county is young as regards its settlement, the evidences of its resources are abundant, and are of such a character as to make it in time one of the wealthiest counties in the State. Its position is such as to give an impulse to the improvement of all its resources. As the enterprises recently set on foot, and all our farming operations are carried on as yet in an unmethodical manner, the meagre account of our statistics will be readily excused. The following is briefly what I have to present.

Wheat.—The crop of the present year in this region has fallen considerably short of our average. Much of the wheat sown early was winter-killed, and late sown wheat was overtaken by the rust and greatly injured. The crop is estimated at nine bushels per acre; while the average of our crops in years past has been more than double that amount, or about 20 bushels. In 1839, the average of the wheat crop was 25 bushels. My own crop that year of 50 acres averaged 34 bushels per acre. This was sown on the sod turned over in May and June; time of sowing from 25th August to 10th September, and well harrowed down; cut and harvested between the 4th and the 20th July. The first when cut was in what is called the *dough*, the last very ripe. The first cut weighed 65 lbs. per bushel; the last 60 to 63 lbs. The first made the finest flour, and the greatest quantity to the bushel. In 1840, I had a beautiful field of 50 acres, surpassing that of the preceding year in appearance, until about the 20th June, at which time when in the milk it was completely blighted by the *rust*. Thousands of acres were thus destroyed this year. But we think we have a remedy for this evil. Indeed, we believe that all these disasters may be avoided by proper attention; first in preparing the ground properly, taking care not to grasp at too much; then sowing at the right season, which is from 25th August to 10th September, and next in choosing the best seed of that kind of wheat which ripens earliest. This is here found to be the *Mediterranean*, which ripens ten days or two weeks earlier than other varieties, which, when they escape the various enemies, are most productive.

Hay.—Timothy, clover, red-top and orchard grass, all thrive well either apart or together. The red-top is peculiarly suitable for our marshes; it very quickly destroys the rank marsh-grass, and solidates the ground, which very soon becomes firm pasture. Our marshes constitute a singular feature of our region of country. In many places they abound with bog-ore. They have been burned in the fall or spring, from time immemorial, by the Indians—and are the earliest pasture for cattle in spring.

Cattle.—Some of the best beef cattle taken to New York market are from this region—North Indiana. Some of the finest milk cows I have ever seen are in La Porte County. I single out one, owned by a neighbor of mine, of which to give a description. Although not of foreign blood, she is a most beautifully formed creature, and of such proportions in her make as indicate a fine milk cow. She is now about nine years old, and gives an amount of rich milk sufficient to produce twelve pounds of butter per week. This cow, when well taken care of, will give milk nine months in the year. Take the round number of 40 weeks, at 12 lbs. per week, at the average price of 12½ cents per lb., and the butter alone amounts to $60 made in nine months.

We export no cheese, although considerable is made for home consumption.

Potatoes.—As almost every community feels interested in the successful

culture of the Irish potato, which has become so extensive and useful an article of food, we deem any and every suggestion which can be made respecting its preservation from the rot to be acceptable. In this section, the Mercer potato seems to be most liable to the disease; so much so, that many persons have ceased to raise them, and cultivate such kinds as are of a harder texture, as the *pink-eye*, for instance, both yellow and white. The peculiarity of the Mercer is its productiveness and early ripening. It is also more easily cooked than any other variety—the pink-eye requiring one-third more time to cook than the Mercer. An experiment was recently made by a farmer, with the view to obtain the seed of the Mercer pure, and was completely successful. In 1847, he planted a single potato-ball or apple; only one seed grew, which produced a stalk upwards of six feet in length, and at the root a few small potatoes. These he planted in 1848, and obtained a little over a bushel of pure Mercers. From this bushel planted last spring, he has this fall harvested sixty bushels of fine potatoes, and *genuine Mercers.* It only remains to test by time these untainted potatoes.

Another farmer informs me that he has uniformly secured his potatoes from the rot by sprinkling over them, in planting, a small portion of unleached ashes before covering with earth.

Corn.—This is now considered the most important crop to which the farmer can turn his attention. It is certainly the most reliable crop in a pecuniary point of view. This season the crop is a large one, and in every respect the most productive we have ever had, and is now completely cured and chiefly housed. The average yield per acre is set down at 40 bushels. This county, which contains upwards of 300,000 acres, has about 15,000 acres in corn the present year, yielding a crop of 600,000 bushels. The average price for the corn marketed last summer was 38 cents. At that rate the value of the corn crop this year, after deducting 100,000 bushels for home consumption, will be $190,000.

In this county, *Iron ore* (bog-ore) abounds; indeed, the beds are said to be inexhaustible. In 1847, a furnace was erected to go by steam; and the business of 1848 was so extensive as to enable the proprietors to defray all the expenses of erection. This year, during the seven months from 1st April, to 1st November, it turned out 700 tons castings, 800 tons of hollow-ware and stoves, and 400 tons of pigs; valued at $70,000.

The following is a list of the average prices of the articles mentioned, from May 1st to November 1st:—

Wheat per bushel 75 cents, corn 38 cents, oats 20 cents, buckwheat 33 cents, barley 45 cents. Irish potatoes 25 cents, sweet potatoes 75 cents, Ruta bagas 25 cents. Hay per ton $5.50. Butter per pound 12½ cents. Cheese 11 cents. Respectfully, yours,

JOHN C. REID.

Hon. THOMAS EWBANK,
Com'r. of Patents.

WHEAT.

"Your experience as to varieties—difference in weight, and of time in ripening—their enemies and diseases—soil and manures best adapted to. [*Circular.*

From the many communications received in reply to circulars, we make the following extracts on the subject of wheat:—

NEW ENGLAND.

Dr. M. F. Morrison, of Bath, N. H., says:—"In this section the *Black Sea* and *Tea* wheat have been most generally raised. The weevil has been its greatest enemy, but is less destructive now than in times past, and can be avoided by sowing as late as the 20th of May. A clayey loam is the best soil, with a compost of lime for manure. A new variety of winter wheat, that is, *new to us*, has been lately introduced, called the 'Golden Straw,' which has succeeded remarkably well. It has been generally supposed that winter wheat would not do well in this section, but this variety has exceeded our expectations. Mr. Leonard Richardson, in this county, (Grafton,) from three bushels of this variety, sown on four acres of newly cleared land, reaped 96 bushels and 6 quarts of excellent clean grain. Mr. Benjamin Thompson of the same town, from eleven acres new land, raised 200 bushels fine wheat. Several smaller pieces, both new and old cultivated land, have produced excellent crops. It is satisfactorily ascertained that the capacity of our land for raising winter grain is sufficient to induce further trials."

Mr. Isaac Hubbard, of Claremont, N. H., writes as follows:—"I came to the farm on which I now reside, more than seventy-two years ago. The country was then new, and wheat was usually the first crop. I cultivated for more than twenty years one variety—*white kernel and straw, bearded*—which seldom yielded less than 20, and often 25 and 30 bushels to the acre. At that time, from 1790 to 1810, more wheat was raised here than was wanted for home consumption, and the surplus was exported. Now we depend upon the West for flour. Very little wheat is sown by our farmers, and what little is sown usually goes to the weevil."

Mr. A. Robinson, of Portsmouth, N. H., says:—"Very few attempts have been made in this section to cultivate winter wheat, and these are usually at a loss to the farmer. Some seasons we obtain a decent crop, but usually the weevil, smut, mildew, and rust, are all very destructive to this grain."

Mr. Samuel Wells, of Northampton, Mass., says:—"Until within the last half century, wheat was raised and manufactured here in large quantities, and sent to distant markets. It was then our principal crop and standard of value. It is now subject to rust, blast, and winter-kill, and cannot be relied on as a profitable crop."

Mr. Aaron Bagg, of West Springfield, Mass., says: "I have raised the *red-chaff* and *white bald.* The former variety does best here, but wheat is an uncertain crop, and much less raised than formerly.* The Hessian fly and weevil are its principal enemies. Manure is seldom applied to the wheat crop, but usually to the previous crop."

Mr. Loring Dean, of Manchester, Vt., says: "The kinds of wheat commonly raised are *Black Sea*, and *Tea* wheat; the former weighing about 62 lbs. and the latter 60 lbs. to the bushel; yields from 20 to 40 bushels per acre; ripens about the first of August; the weevil its greatest enemy, and rust its principal disease. The best soil is calcareous loam."

Mr. Ariel Thurston, of Hydepark, Vt., says: "The *Black Sea* variety is less liable to injury from rust or insects, but the bearded or bald white wheat makes the best flour. Soil best adapted, loam or marl; and on our highest lands the crop is much surer than on low grounds; average weight 60 lbs.; early sown wheat, cut about the middle of August—late sown, in September."

Mr. Geo. W. Drisko, of Jonesboro', Maine, writes: "But little attention is given to the cultivation of this grain in our section. The rust and mildew have been so destructive, that our farmers think growing wheat a sort of lottery, with the chances decidedly against them. Ten years ago we thought that a crop of from 15 to 25 bushels per acre might fairly be expected, but now we consider ourselves fortunate to get back the *seed*. The last field of wheat I saw growing was entirely destroyed by rust, rendering the labor expended on it a total loss."

Mr. Harvey Hantoon, of Unity, N. H., says: "The best variety we have is the *Black Sea* wheat. It produces 45 lbs. of flour to the bushel. The weevils are its greatest enemies, but they can be avoided by sowing as late as the 20th of May; harvested about 27th August. The Black Sea is less subject to the rust than any other variety we have tried; produce, about 20 bushels to the acre."

NEW YORK.

Mr. J. J. Thomas, of Macedon, Wayne Co., writes as follows: "The best variety for this region is the *Soules* wheat. The average yield this year has been 18 bushels per acre. The *Mediterranean* is peculiarly adapted to wet lands, and but little liable to the attacks of the Hessian fly; but the flour is usually regarded as of an inferior quality: this variety has yielded about 12 bushels per acre. The Soules wheat requires a dry soil; hence the Mediterranean will flourish where the Soules is not adapted to the soil. The *white flint* is but little cultivated; has yielded only about 12 bushels per acre."

Myron Adams, of East Bloomfield, Ontario Co., says: "Wheat is our principal crop. The kinds mostly cultivated are *white flint* and *Soules*. The *Soules wheat* is a variety lately introduced, and is every year becoming more and more popular. It requires earlier sowing and more seed than the *flint*, as it does not tiller or spread from the root like the last named variety; it is not as hardy, but on good land, under good cultivation, and with favorable seasons, it will produce more than any other kind cultivated in this region. The great objection to it is its liability to waste by shelling in harvesting. It should be cut before it is fully ripe. The *white flint* is a variety long known and cultivated in western New York. It is very hardy, with a small wiry straw, and short head, usually well filled. It produces well under almost any treatment; will bear much exposure to bad weather, and may be kept long in the field after harvest without shelling; yields well according to amount of straw. The berry is whiter, and makes whiter flour and more to the bushel, than any other kind with which I am acquainted.

Our wheat weighs from 58 to 63 lbs. to the bushel, and on the best wheat lands, in favorable seasons, the yield is from 30 to 40 bushels per acre. Much is grown, however, on poor lands under miserable culture, where from 6 to 15 bushels is called a fair crop. The amount of wheat per acre is increasing under improved culture and better implements constantly introduced among us, and also through the stimulus which Agricultural Societies afford."

"In Oswego county," Mr. S. Severance writes, "wheat culture is nearly abandoned, although when the county was new considerable was grown. Weevils and heavy snows in winter are very destructive to this crop. Seven-eighths of the flour consumed in this county is from western wheat." If our correspondent had said, that the peculiar earthy salts demanded by nature to form good crops of this grain had become measurably exhausted in the soil of that county, he would have hit the nail on the head. Seventy-five years ago Albany county produced an average of 25 bushels per acre—now the average is only 7½ bushels. Columbia county has fallen off from 20 to 6 bushels, and other counties in like ratio.

"To prevent rust and weevil," Mr. Joseph H. Merreck, of Delaware Co., says, "early sowing is indispensable. Lime, ashes, and gypsum are the fertilizers most relied upon for wheat in this section."

MIDDLE AND SOUTHERN STATES.

Joseph M. Nesbit, of Union Co., Pa., writes as follows: "Previous to 1820, the *red-chaff* was extensively cultivated, and esteemed one of our best varieties. About that time a new variety called the *blue-stem* was introduced, which on trial was found superior to the above, and we have now cultivated it almost exclusively for near twenty years. We have in the mean time tried several other kinds of both white and red wheat, to test their character; but have uniformly found them deficient in some important property, and have abandoned them as inferior to the *blue-stem*. In 1845 we harvested from 33½ acres an average of 36¼ bushels per acre. Several acres could have been selected, the yield of which would have exceeded 40 bushels to the acre. We consider 25 bushels a fair average for the best wheat lands, and with proper cultivation we think they can be made to yield that. The best soils are river bottoms and limestone formations. *Quantity of seed*.—A few years ago, 1¼ bushels was considered amply sufficient, but now we are obliged to sow 1½ bushels at least, and some farmers sow 2 bushels. The latter quantity we consider too much. The necessity for thicker sowing is in part owing to the use of threshing machines, by which a portion of the seed is broken and the vitality destroyed; and also to the increase of predatory insects in long cultivated soils. Early sowing is the best preventive against the Hessian fly. We prefer to sow from 18th to 25th September; if later than the 25th, we run more risk from winter-killing, and if we escape this, are pretty sure to be caught by the rust or mildew in harvest."

Mr. William Price, of Chester county, Pa., says: "The *Mediterranean* wheat ripens earliest, about the 1st of July. It requires early sowing, and is seldom injured by the fly. Mildew or rust is produced by the bursting of the straw in the process of ripening, supposed to be caused by a superabundance of sap, which the plant cannot absorb or properly discharge. It therefore issues and evaporates, leaving a sediment or rust adhering to the straw, which prematurely dies, and the grain becomes shriveled or light.

A clayey soil is best adapted to wheat, and when lime is not an ingredient in the soil, it should be judiciously applied."

In Germantown, Pa., Mr. George Blight informs us, that the *Mediterranean* is preferred. It ripens in June, and thereby escapes the wet weather of July; yields about 20 bushels per acre. Soil, sandy loam with clay sub-soil. Barnyard manure is applied, about 20 loads to the acre, and ploughed in.

In Juniata county, Pa., the *white flint* is most cultivated, and ripens from July 1st to 10th. Soil, limestone; weight of grain, 60 to 64 lbs.; authority—Mr. Stewart Turbett, of Port Royal.

Mr. R. C. Holmes, Cape May, N. J., says: "The *Washington bald* is, perhaps, the most productive, the *Mediterranean* the most certain and heaviest—58 lbs. average weight per bushel. The fly, rust, and smut are very destructive. Barnyard manure, with lime, will produce the largest crops."

Mr. W. P. Morgan, of Princess Ann Co., Va., says: "There is but a small portion of our land adapted to the cultivation of wheat, and until the last 15 years very little was made; a few farmers sowed enough for a 'harvest home.' Since then there has been exported in a single year from this county, 20,000 bushels. But for three years past the crops of wheat have been on the decline, both in quantity and quality. The *early white* and *Mediterranean* are the varieties preferred."

Mr. H. B. Jones, of Brownsburg, Va., says: "Of all the varieties cultivated in this vicinity, the *Mediterranean* is most to be relied on; weighs from 60 to 64 lbs. per bushel. The *blue-stem* is a good red wheat, and weighs about 60 lbs. The New York *white flint* is highly esteemed by some; average yield about 10 bushels per acre."

Mr. J. Harris, of Cabanis Co., N. C., writes: "Wheat culture is becoming more general in this section, but the crop of 1849 will be far short of that of 1848, owing to the severe cold weather about the middle of April. A large portion of our *May* wheat, which is a variety much grown here, was then killed. We shall have this year about half the usual crop. Time of sowing, from 1st October to 15th November. Of the varieties grown, the *golden-chaff* and *May* wheat are usually preferred."

Dr. D. L. White, of Quincy, Fla., writes: "We have tried several kinds of wheat in Florida, and but one, a bearded variety, succeeds well in our climate. This kind has now been cultivated three years, and has never been affected by the rust or smut."

Simeon Oliver, of Hernando, Miss., says: "My experience is confined to *red May* wheat—it ripens the last of June, and weighs 60 to 65 lbs. to the bushel—yields 10, sometimes 15, to 1—is subject to rust, fly, and weevil—clay loam the best soil. No manures tried."

In Coosa county, Ala., Mr. S. S. Graham says: "*Horton* wheat is the most approved variety, and frequently weighs from 65 to 70 lbs to the bushel. Harvested the last of May. Wheat of all kinds killed by severe frost on the 16th May. Cotton seed, 50 bushels to the acre, used as a fertilizer for wheat. Cost of making wheat, about 75 cents per bushel—product per acre has increased of late years—when put up in good bags, it will be secure from the attacks of the weevil."

In Jackson county, Ala., Mr. James Williams writes: "Average yield in this county ranges from 10 to 15 bushels per acre—cost of raising, 50 cents per bushel. The *Orleans* variety preferred. Owing to severe frosts, the crop this year will be 25 per cent. less than in 1848. The ordinary market value from 70 cents to $1.00 per bushel. We have not heretofore in Northern Alabama, grown more than half enough for home consumption; but as there appears a disposition among planters to quit cotton growing, they will necessarily raise more wheat. We have now the benefit of the Augusta and Charleston markets, which will offer greater inducements for the culture of this crop."

Mr. Benjamin Whitfield, of Tuscaloosa, Ala., writes: "The *Orleans* and *Italy* are the best varieties—ripen about 20th May. Smut may be prevented by steeping the seed in brine, and drying it in lime. The weevil can be kept from it by threshing early, and then putting it away in the chaff and short straw, and covering it well with straw. Our lands are destitute of lime, and consequently poor for wheat—8 bushels per acre is a full average crop. Cotton seed the best manure."

Mr. James Price, of Chattoogaville, Chattooga county, Ga., in a letter to Hon. J. H. Lumpkin, says: "We have abundant crops of every kind—100 acres of wheat yielded 20 to 25 bushels per acre, and I would send some to the Patent Office if it could be done free of expense. I learned my mode of preparing seed from the Report for 1844. To prevent injury from weevil, I cut my wheat, and let it stand two or three weeks in the field after cutting, in small shocks, well capped—thresh out dry, and run through the fan 10 or 15 days thereafter. I frequently strew some china leaves on it. These, together with the airing and cleaning, have been a preventive with me."

WESTERN STATES.

Mr. Wm. Lapham, of Mt. Tabor, Champaign county, Ohio, writes as follows: "Within the last three years the *Mediterranean* wheat has almost entirely superseded the kinds formerly cultivated; its weight is about 65 lbs. to the bushel. The *red-chaff bearded*, *Wabash*, and *Alabama* wheats have all been tried, but were found liable to both rust and winter-killing. The fly, the rust, and the sudden changes of temperature in winter are the chief causes of the failure of the wheat crop in this vicinity. The *Mediterranean*, from its ripening about 1st July, a week or ten days earlier than other varieties, escapes in a great measure injury from rust. It will also bear to be sown late in the fall, so as to escape the fly, unless the season is unusually warm. On very rich soil it is more liable to lodge than other varieties. The winters in this latitude are so subject to alternations of freezing and thawing, by which the wheat plant is thrown out of the ground, that the crop is very uncertain; averaging not more than 12 to 15 bushels per acre in a series of years. But in seasons when the temperature of the winter is comparatively uniform, and especially when the ground is most of the time covered with snow, the wheat crop attains its greatest yield; often averaging as high as 20 to 25 bushels per acre. I speak of crops where the usual ordinary care has been bestowed on preparation of the ground and sowing."

Mr. Alexander Ruff, of Xenia, Ohio, says: "My experience in varieties is, that *dark* or *red wheats* are hardier and a surer crop than the *white* or *fair* kinds. They ripen from 8 to 10 days earlier, and weigh 2 to 4 lbs. more per bushel. The Hessian fly is the greatest enemy to our wheat crop, and can best be prevented by rich soil and late sowing. The rust destroys much wheat, and has been constantly increasing for the last 12 years. The best soil is a clay, with a gravel subsoil, and lying high and dry. A crop

of corn or of oats should always be taken from the land after manuring, before the wheat is sown. This grain has been more uncertain, and less profitable to raise for some years past than it formerly was."

"The *red straw* and *Mediterranean*," says Mr. David Bush, of Delaware, Ohio, "are the earliest varieties, and least liable to rust, or injury from the fly, of any cultivated in this section. They are also one or two pounds heavier to the bushel—ripen about the last week in June—best soil, a sandy loam."

From Hamilton Co., Ohio, Mr. Israel Brown writes as follows: "The *red-chaff* bearded has hitherto been considered the most certain and profitable. Sowed about 10th Sept., and harvested 4th July—weight 60 to 62 lbs. per bushel. Sowing late prevents the ravages of the fly, but in this case the roots are not so firmly set, and it is consequently more liable to rust and winter-kill. The *golden straw* and *Mediterranean* have lately been introduced and are cultivated with success. The latter variety has become quite popular, as it will admit of late sowing and is less liable to the depredations of the fly. Average yield of this kind, 20 bushels per acre."

J. McComb, Jeromeville, Ashland Co., O., says: "The *Garden, blue-stem*, and *Mediterranean* are the varieties here grown; of these, the last is the heaviest. I consider sandy loam the soil best adapted to wheat. Cost of cultivation, $6 per acre; the average yield per acre is increasing in this county."

Mr. Linus Cone writes us from Troy, Mich., as follows: "The *Hutchinson* and *flint* are the varieties principally grown. The *Soules, blue-stem*, and several new varieties have lately been introduced, and promise well. Three years since, I sowed one peck *Soules* wheat on ¼ of an acre: the product was 7 bushels, six of which were sown the next season on 4 acres and produced 152 bushels. The fly, rust, and winter-kill have materially injured the wheat crop for several years past. But if sown from 20th September to 5th October, there is no danger from the fly, and if the ground is properly cultivated and drained, we need have no fear of winter-kill. For several years the average product per acre has been decreasing, and the yield will not now exceed 10 bushels. Various causes have been assigned for this, and it is attributed by many to the seasons; but I am satisfied that the true cause of the failure is, the exhaustion of the food of the wheat plant in the soil, from constant cropping and shallow ploughing. Fourteen years since, I commenced an entirely new system of putting in wheat, by ploughing twice the usual depth, say 10 or 12 inches, and manuring with green crop (clover) where the soil was exhausted. I increased the seed to 2 bushels per acre, and by thorough draining and top-dressing with plaster in the spring, I doubled the yield per acre and rendered the crop sure. The highest average since then has been 43 bushels, and the lowest 28½ bushels to the acre, making a general average for the whole time, of over 30 bushels. Every bushel of this has been disposed of as merchantable, and would, with one trifling exception, come up to the legal standard of 60 lbs. per bushel. During this time, I have not been troubled with the insect, winter-kill, or rust. The soil in this county is clay loam, gravel, and sand, nearly all adapted to the cultivation of wheat."

NOTE.—We commend the example of Mr. Cone to wheat-growers everywhere. It will be seen from these extracts, that in almost every part of the country, through exhaustion of the soil and bad tillage, the wheat crops

are decreasing, and becoming more and more subject to disease. For this there is but one remedy: an improved system of culture. Farmers must supply to the soil those elements necessary for the formation of healthy wheat plants, which are constantly being taken from the land, and sent to distant markets. (See remarks on "*The Culture of Wheat.*")

From Wisconsin, Mr. C. S. Chase, of Racine, writes: "*Hedge row* for spring, and *red-chaff* and *Black Sea* for winter, are the principal varieties. We have, however, almost every kind in use. Wheat in this vicinity is mostly raised on the prairies, but the timber lands are better adapted to its culture. Its enemies are the weevil, mildew, and rust, the last having the present season destroyed one-half the crop. Wheat is the principal product of this state."

Mr. Origen Perkins, of Burlington, Wisconsin, says: "Wheat has been our staple product, and a few years ago we raised large crops at little cost of labor or skill. But for three or four years past it has been a precarious crop, especially on old lands, owing doubtless to the common fault of almost every farmer bringing more land under cultivation while it is fresh and clean, than they can afterwards manure and cultivate well. Thus they exhaust the food necessary for the production of wheat, and the plant grows every year weaker, and more liable to winter-kill. The last winter and spring were unusually favorable, and wheat promised a good crop, until it was blighted early in July by intensely hot weather, averaging about half a crop, say 10 bushels per acre. Owing to the causes above mentioned, together with the ravages of the fly and the high price of labor, wheat for some years past has been deemed an unprofitable crop."

Mr. Ralph Ware, President of an Agricultural Society called the "Buel Institute," in Putnam and the adjoining counties, Illinois, writes as follows: "The best varieties of wheat grown here are the *crate* or *velvet chaff* and the *red-chaff*. The latter is the heaviest, and stands the winter best. It weighs about 62 lbs. to the bushel. The *crate* wheat is somewhat the earliest, and suffers less from rust; time of harvesting from 1st to 8th July; average yield, 18 bushels per acre. The principal difficulties in its cultivation are from rust and dry freezing weather in winter. Spring wheat this year has been a failure. The average yield of wheat per acre is increasing in this section, from a better knowledge of the soil and climate, and from greater attention paid to its culture."

Mr. Wm. A. Hacker, of Jonesboro', Ill., remarks: "*May, blue-stem*, and *white flint* are the principal varieties; weight and time of ripening about the same, the *May* wheat being, if any thing, a little earlier than the others; average weight, 64 lbs. per bushel. The rust is very destructive, and this year we shall not have more than half a crop. Heavy alluvial the best soil. No manures necessary in this fertile country."

Dr. John Little, of Cass Co., Ind., says: "I have cultivated for three years past, a kind of wheat, the name of which I cannot with certainty give, but suppose it to be the 'Etrurian.' The seed was sent from the Department at Washington to a friend who cultivated it in his garden, until seed sufficient for a field crop was obtained. This variety promises to be highly beneficial to this region, as it will bear sowing late, ripens early, tillers well, and has firm straw. It also yields largely to the acre, and the proportion of flour to bran is greater than in the common varieties. The *crate, golden-chaff*, and *red-chaff* are much cultivated in this section. They

are about alike in weight and time of ripening; all, if sown early, are liable to injury from the fly, and if the sowing is delayed to escape this evil, there is much risk incurred from rust. But little attention has as yet been given to determine the difference made by soil and manuring of this crop; as in this region we have a comparatively virgin soil, and our cultivators are not prepared to make experimental observations."

Mr. B. W. Hawkins, of Portland, Jay Co., Ind., writes: "The average weight of the *Mediterranean* wheat in this section is 64 lbs., of *white chaff bearded* 62 lbs., *red-chaff* and *golden-stem* 60 lbs., *Wabash smooth* 60 lbs. The Mediterranean and golden stem ripen about a week earlier than the other varieties. Rust is the principal enemy. Sandy soil best adapted to this crop. Stable manure the only kind used in this part of the state."

Mr. John Bell writes from Floyd Co., Indiana, as follows: "The Mediterranean is now preferred to any other variety cultivated here. It is equal to any in weight, is less subject to injury from the fly, and as it ripens early rarely suffers from the rust. This year rust has been the cause of failure in almost every other variety, while this has generally yielded well. A calcareous or limestone soil best adapted to its culture."

In Scott Co., Iowa, Mr. James Grant writes as follows: "Spring wheat has been more successful than the winter varieties in this vicinity, in consequence of the injury the latter sustained from various irregularities in the weather, during the winter and spring. The *Red-river* variety of spring wheat is regarded as the best; it has a plump berry, thin skin, and good weight—often exceeding 64 lbs. to the bushel. It is more liable to smut than some other kinds, but this can be prevented by steeping the seed in lime and sowing when the ground is dry. I think it is the experience of every observing man that all kinds of wheat are more subject to smut when sown on *wet* lands, than on *dry*. This county contains about 5000 inhabitants, and 600 farmers; each of whom averages 60 acres under cultivation. They produced this year 200,000 bushels of wheat from about 20,000 acres."

Mr. J. W. Calvert, of St. Francis Co., Ark., writes as follows: "But two varieties have been tried in this section; the *red-chaff bearded*, and the *smooth May* wheat. The former makes bread the most palatable, and of the richest flavor. It is an uncertain crop, and very liable to injury from rust and mildew; but is less subject to attacks of the weevil than the latter variety. I raised both these kinds the same year, threshed and cleaned them out at the same time, and placed a flour barrel of each side by side. On examination some months after, I found the *May* wheat almost entirely destroyed by the weevil, while the *bearded* was very little injured. The result of this experiment would seem to favor the idea, that the egg of the insect is laid in the grain before maturity, and is hatched like the pea-bug, after the wheat is cleaned and put away; and that the bearded varieties are less liable to be thus stung by the insect than the bald or smooth kinds. It is said by some, that exposing the grain a few days to the sun after cleaning, or putting up in barrels that have contained salt, are sure preventives against the depredations of the weevil."

Mr. A. L. Burum of Mill Bend, East Tenn., gives the following as the results of his experience: "To insure a good crop on my part, I take a field of old grazing or clover land, without pasturing the year I intend to sow it. About the last of August I turn it over with a turn plough, after first coultering with a two-horse coulter as deep as practicable, covering all the vegetation. In October the wheat is sown, one bushel or forty quarts per

acre. If the soil is clay and wet, it will be necessary to cross-plough lightly before sowing—if a loam, my experience is against it. The ploughing should always be done in beds from 16 to 18 feet in width, and after sowing and harrowing, open the centres of the beds with the plough, to drain off the surplus moisture from the wheat. When this draining is well done, a wet stiff soil is best for wheat in East Tennessee. If the land is poor it should be manured with barn-yard manure before sowing, or with lime sown broadcast, 10 bushels to the acre, after sowing. When the above precautions are taken, the rust and smut rarely injure the crop. Should the blade of the wheat in April be heavy and of a deep green color, pasture it down; for this is an evidence that the root has not penetrated deep enough into the earth, and if let alone, it is liable to injury from late frosts, rust, &c. If the plant is of a yellowish hue, and inclined to blade out close to the ground, it is a good omen for an abundant crop."

From Kentucky, Mr. E. Starks, of Graves Co., writes as follows: "*May* wheat and *golden-chaff* are the kinds cultivated. I prefer the latter; it ripens about the 25th June—the *May* wheat ripens about the 10th. The *golden-chaff* has a long plump berry, and weighs from 62 to 65 lbs. to the bushel. Four bushels sown on four acres gave 82½ bushels at the harvest. I feed the wheat closely in winter to destroy the eggs of the Hessian fly—stock should be taken off as soon as the wheat begins to start in the spring. Early seeding is preferred. Ten bushels per acre is a fair average for this county."

Dr. S. D. Martin, of Clarke Co., Ky., writes: "Those kinds that ripen early are best for our locality. The Hessian fly and rust are both very injurious to the crop. If we could foresee what kind of seasons we are to have, so as to sow *too late* for the fly, and *too soon* for the rust, we should do well. The early varieties are more likely to escape the rust when sown late."

THE CULTURE OF WHEAT.

There is no crop, the skillful and successful cultivation of which on the same soil, from generation to generation, requires more art than is demanded to produce good wheat. To grow this grain on fresh land, adapted to the peculiar habits and wants of the plant is an easy task. But such fields, except in rare instances, fail sooner or later to produce sound and healthy plants, which are little liable to attacks from the malady called "rust," or which give lengthened ears or "heads," well filled with plump seeds.

Having long resided in the best wheat-growing district in the Union, the writer has devoted years of study and observation to all the influences of soil, climate, and constitutional peculiarities, which affect this bread-bearing plant. It is far more liable to smut, rust, and shrink in some soils than in others. This is true in western New York, and in every other section where wheat has long been cultivated. As the alkalies and other fertilizing elements become exhausted in the virgin soils of America, its crops of wheat not only become smaller on an average, but the plants fail in constitutional vigor, and are more liable to diseases and attacks from parasites and destructive insects. Defects in soil and improper nutrition lead to these disastrous results. Soils are defective in the following particulars:

1. They lack soluble silica, or flint in an available form, with which to produce a hard glassy stem that will be little subject to "rust." Soluble flint is never very abundant in cultivated soils; and after they have been tilled

some years, the supply is deficient in quantity. It is not very difficult to learn with considerable accuracy the amount of silica which rain-water as it falls on the earth will dissolve out of 1000 grains of soil in the course of 8 or 10 days. Hot water will dissolve more than cold; and water charged with carbonic acid more than pure water, which has been boiled. The experiments of Prof. Rogers of the University of Virginia, as published in Silliman's Journal, have a direct bearing on this subject. The researches of Prof. Emmons of Albany, in his elaborate and valuable work on "Agriculture," as a part of the Natural History of New York, show that 10,000 parts of soil yield only from 1 to 3 parts of soluble silica. The analyses of Dr. Jackson, as published in his Geological Survey of New Hampshire, give similar results. Earth taken from an old and badly exhausted field in Georgia gave the writer only one part of soluble flint in 100,000.

What elements of crops rain-water, at summer heat, will dissolve out of 10 or 20 lbs. of soil, in the course of three months, is a point in agricultural science which should be made the subject of numerous and rigid experiments. In this way, the capabilities of different soils and their adaptation to different crops may be tested, in connection with practical experiments in field culture, on the same kind of earth.

Few wheat-growers are aware how much dissolved flint an acre of good wheat demands to prevent its having coarse, soft, and spongy stems, which are any thing but a healthy organization of the plant. In the Journal of the Royal Agricultural Society of England, volume 7, there is an extended "Report on the Analysis of the Ashes of Plants, by *Thomas Way*, Professor of Chemistry at the Royal Agricultural College, Cirencester," which gives the results of 62 analyses of the ash of wheat, from as many samples of that grain, mostly grown on different soils and under different circumstances.

In this Report are given the quantity of wheat per acre, the weight of straw cut close to the ground on each acre, and also that of the chaff. These researches show, that from 93 to 150 lbs. of soluble flint are required to form an acre of wheat; and I will add from my own investigations, that three-fourths of this silica is demanded by nature during the last 60 days preceding the maturing of the crop. This is the period in which the stem acquires its solidity and strength, and most of its incombustible earthy matter. The quantity of this varies from 8 to 15 per cent. of the weight of the straw. Prof. Johnston and Sir Humphry Davy give instances in which more than 15 per cent. of ash was found; and Prof. Way gives cases where less than 3 per cent. was obtained. The mean of 40 samples was $4\frac{1}{2}$ per cent. Dr. Sprengel gives $3\frac{1}{2}$ as the mean of his analyses. M. Boussingault found an average of 7 per cent. As flint is truly the *bone* of all the grass family, imparting to them strength, as in cane, timothy, corn, oats, rye, rice, millet, and the proportion of this mineral varies as much in wheat-straw, as bone does in very lean and very fat hogs or cattle.

A young growing animal, whether a child or a colt, that is kept on food which lacks *bone-earth*, (phosphate of lime,) will have soft cartilaginous bones. Nature cannot substitute *iron* or any other mineral in the animal system, out of which to form hard strong bones; nor can any other mineral in the soil perform the peculiar function assigned to silica in the vital economy of cereal plants. To protect the living germs in the seeds of wheat, corn, oats, rye, barley, &c., the cuticle or bran of these seeds contains considerable flint. The same is true of chaff.

The question naturally arises,—How is the farmer to increase the quan-

tity of soluble silica or flint in his soil? This is a question of the highest practical importance. There are three principal ways in which the object named may be attained. First, by keeping fewer acres under the plough. Land in pasture, if well managed, will gain in fertility, and in the process accumulate soluble silica in the surface soil. In this way more wheat and surer crops may be made by cultivating a field in wheat two years than four in six. If the field in the mean time be devoted to wool-growing, butter or cheese-making, or to stock-raising, particular care must be taken to make great crops of grass or clover to grow on the land, and have all the manure both solid and liquid applied to its surface.

There are many counties in England that yield an average of 32 bushels of wheat per acre for ten crops in succession. There are but few of the old counties in the United States which average the half of that quantity: and yet our climate has greater agricultural capabilities than that of Great Britain. This fact has been made abundantly evident in an article under the head of "Agricultural Meteorology."

Another way to increase soluble silica in the soil, is to grow such crops, in rotation with wheat culture, as will best prevent the loss of dissolved flint at any time by leaching and washing, through the agency of rain-water. This remark is intended to apply more particularly to those large districts devoted to cotton and tobacco culture, plants that take up no considerable amount of silica, and which, by the constant stirring of the earth, and the clean tillage which they demand, favor the leaching of the soil. To keep too much of a plantation in these crops, is to lessen its capabilities for producing good crops of corn, wheat, and barley, at a small expense. Corn plants, well managed, will extract more pounds of silica in three or six months from the soil, than any other. As not an ounce of this mineral is needed in the animal economy of man or beast, it can all be composted in cornstalks, blades, and cobs, or in the dung and urine derived from corn, and be finally reorganized in the stems of wheat plants. Corn culture and wheat culture, if skilfully and scientifically conducted, go admirably together. Of the two, more bread, more meat, and more *money* can be made from the corn than from the wheat plant in this country. But so soon as what is called "high farming" in England, shall be popular in the United States, the crops both of wheat and corn grown here will demonstrate how little we appreciate the vast superiority of our climate for the economical feeding and clothing of the human family, over that of our "mother country." In several counties in England, it takes from 12 to 14 months to make a crop of wheat, after the seed is put in the ground. At or near the first of December, 1847, Mr. M. B. Moore, of Augusta, Ga., sowed a bushel of seed wheat on an acre and a half of ground, which gave him over 30 bushels by the middle of May following. This ground was then ploughed, and a fine crop of hay made and cut in July. After this, a good crop of peas was raised and harvested in October, before it was time to seed with wheat again, as was done. While the mean temperature of England is so low, that corn plants will not ripen, in Georgia one can grow a crop of wheat in the winter, and nearly two crops of corn in succession in the summer and autumn, before it is time to sow wheat again. No writer, to my knowledge, has done full justice to the vast agricultural resources of the southern portion of the American confederacy. But there is much of its soil which is not rich in the elements of bread. Nothing but the careful study of these elements, and of the natural laws by which they are govern-

ed, can remedy defects in wheat culture anywhere, but especially on very poor land.

All alkaline minerals, such as potash, soda, lime, ammonia, and magnesia, hasten the solution of the several insoluble compounds of silica in the soil. This fact should be remembered by every farmer. To undertake an explanation of the various ways in which alkalies, oxides, and acids act and react upon each other in the surface of the earth, when subject to tillage, would be out of place in this outline view of wheat-growing in the United States. I may state the fact, however, as ascertained by many analyses, that a cubic foot of good wheat soil in the valley of the Genesee, contains 20 times more lime than do the poorest soils in South Carolina and Georgia. The quantity of gypsum, bone-earth, and magnesia, available as food for plants, varies in an equal degree.

Not only lime, but phosphoric acid, potash, and magnesia are lacking in most soils, if one desires to raise a large crop of wheat, and have the seeds of the grain weigh as much as the straw. In a number of the specimens of wheat analyzed by Prof. Way, when cut close to the roots, the dry wheat outweighed the dry straw.

Having secured the growth of a bright, hard, glassy stem, the next thing is to develope a long, well-filled ear. To this end, available ammonia or nitrogen, phosphorus, potash, and magnesia are indispensable. Ammonia (spirits of hartshorn) is necessary to aid in forming the combustible part of the seed. The other ingredients named are required to assist in making the incombustible part of the grain. In 100 parts of the ash of wheat, there are the following substances, viz.:

Silica	2.28
Phosphoric acid	45.73
Sulphuric acid	0.32
Lime	2.06
Magnesia	10.94
Peroxide of iron	2.04
Potash	32.24
Soda	4.06
Chloride of sodium	0.27
Total	99.94

The quantity of ash in wheat varies from $1\frac{1}{4}$ to $2\frac{1}{2}$ per cent.; the average is about 1.69. The amount of phosphoric acid in any given quantity of the ash of wheat varies from 40 to 50 per cent. of the same.

Seeds that have a thick cuticle or bran, and little gluten, contain a smaller per centage of phosphoric acid, and more silica. About one-third of the ash is potash; in nearly all cases magnesia varies from 9 to 14 per cent.; lime from $1\frac{1}{2}$ to 6 per cent. Peroxide of iron is seldom as abundant as in the ash above given, and the same is true of soda. Chloride of sodium is common salt, and exists in a small quantity. Salt is beginning to be much used as a fertilizer on wheat lands in western New York. It operates indirectly to increase the crop.

The following may be taken as about the average composition of the ash of wheat-straw. It is "Specimen No. 40," in the tables of Prof. Way, and I copy verbatim all that is said on the subject: [Soil, sandy; subsoil, stone and clay; geological formation, silurian; drained; eight years in tillage; crop, after carrots, 20 tons per acre; tilled December, 1845; heavy

crop; mown, August 12th; carried, August 20th; estimated yield, 42 bushels per acre; straw long, grain good, weight 62 lbs. to the bushel.] Length of straw, 42 inches.

Relation of Grain, Straw, and Chaff.

	Actual quantities.	Per centage.
Grain	1633 lbs.	45.15
Straw	1732	47.89
Chaff	250	6.96
Total	3615 lbs.	

Specific gravity of grain	1.396
Weight of grain per acre	2604 lbs.
" " straw " "	$2775\frac{3}{10}$
" " chaff " "	$401\frac{1}{5}$

Mineral Matter in an Acre.

Wheat	$44\frac{1}{2}$ lbs
Straw	113
Chaff	$47\frac{1}{5}$
Total	$204\frac{7}{10}$

Analysis of the Ash of the Grain.

	Per centage.	Removed from an acre	
Silica	5.63	2 lbs.	8 oz.
Phosphoric acid	43.98	19	8
Sulphuric acid	.21	0	$1\frac{1}{5}$
Lime	1.80	0	$12\frac{8}{10}$
Magnesia	11.69	5	$3\frac{2}{10}$
Peroxide of iron	.29	0	2
Potash	34.51	15	$5\frac{6}{10}$
Soda	1.87	0	$18\frac{3}{10}$
	99.98	44 lbs.	$6\frac{1}{10}$ oz.

Analysis of Straw with its proportion of Chaff.

	Per centage.	Removed per acre.	
Silica	69.36	111 lbs.	$1\frac{7}{10}$ oz.
Phosphoric acid	5.24	8	$6\frac{7}{10}$
Sulphuric acid	4.45	7	$2\frac{2}{10}$
Lime	6.96	11	$2\frac{2}{10}$
Magnesia	1.45	2	5
Peroxide of iron	29	1	2
Potash	11.79	18	14
Soda	none	none.	
Chloride of sodium	"	"	
Total	99.54	160 lbs.	$1\frac{1}{10}$ oz.

If we subtract the 111 pounds of silica from the 160 pounds of minerals in the straw and chaff, the difference between what are left and those in wheat, is not great. As the stems and leaves of wheat plants grow before their seeds, if all the phosphoric acid, potash, and lime available in the soil

is consumed before the organization of the seeds begins, from what source is nature to draw her supply of these ingredients to form a good crop of wheat? If the farmer could reverse the order of nature, and grow a good supply of seeds first, and make straw afterwards, then many a one would harvest more wheat and less straw. But the cultivator must grow the stems, roots, and leaves of wheat, corn, and cotton, before nature will begin to form the seeds of these several plants: and every one should know that the atoms in the soil, which are consumed in organizing the bodies of cultivated plants, are, in the main, identical in kind with those required to make their seeds. The proportions, however, differ very considerably. Thus, while 100 parts of the ash of wheat contain an average of 45 parts of phosphoric acid, 100 of the ash of wheat-straw contain an average of only 5 parts. The difference is as 9 to 1. In magnesia the disparity is only a little less striking.

In what are called the organic elements of wheat (the combustible part) there are seven times more nitrogen in 100 pounds than in a like weight of straw. Hence, if the farmer converts straw into manure or compost, with the view ultimately of transforming it into wheat, it will take 7 pounds of straw to yield nitrogen enough to form one pound of wheat. Few are aware how much labor and money is annually lost by the feeding of plants on food not strictly adapted to the peculiar wants of nature in organizing the same. It is true, that most farmers depend on the natural fertility of the soil to nourish their crops, with perhaps the aid of a little stable and barn-yard manure, given to a part of them. As the natural resources of the land begin to fail, the supply must be drawn from other quarters than an exhausted field, or its cultivator will receive a poor return for the labor bestowed.

In Great Britain, where the necessity for liberal harvests and artificial fertilizing is far greater than in this country, the yield of wheat is said to be governed in a good degree by the amount of ammonia available as food for growing plants. This opinion is founded not at all on theory, but altogether on the teachings of experience. But in England, limeing and manuring are so much matters of constant practice, that few soils are so impoverished as many are in the United States. With land as naked and sterile as is much that can be found in the old thirteen colonies between Maine and Alabama, English farmers could hardly pay their tithes and poor rates, to say nothing of other taxes, rent, and the cost of producing their annual crops.

The first step towards making farming permanently profitable in all the older States, is to accumulate in a cheap and skillful manner the raw material for good harvests, in the soil.

Over a territory so extensive as the United States, it is extremely difficult to lay down any rule that will be applicable even to a moiety of the republic. There are, however, many beds of marl, greensand, gypsum, limestone, saline and vegetable deposites, available for the improvement of farming lands, in the Union. In addition to these, there are extraneous resources, the ocean with its fish, its shells, its sea-weeds, and its fertilizing salts which will yield an incalculable amount of bread and meat. In the subsoil and the atmosphere, every agriculturist has resources which are not duly appreciated by one in a thousand.

As a general thing, the soil must be *deepened* before it can be permanently improved. One acre of soil 12 inches deep is worth more to make money from, by cultivating it, than four acres 6 inches in depth. Thus, admit that a soil 6 inches deep will produce 14 bushels of wheat, and that 12 bushels will pay all expenses and give 2 for profit. Four acres of this land will yield a net income of only 8 bushels. Now double the depth of the soil and the crop: making the latter 28 bushels, instead of 14 per acre, and the former 12 inches deep, in the place of 6. Fifteen bushels, instead of twelve, will now pay all annual expenses, and leave a net profit not of *two* but of *thirteen* bushels per acre. If small crops will pay expenses, large ones will make a fortune; provided the farmer knows how to enrich his land in the most economical way. It is quite as easy to pay too dear for improving lands, as to lose money at any other business whatever.

The first thing for the operator to do is to acquire all the knowledge within his reach, from the experience of others who have done for their soils what he proposes to accomplish for his. Twenty or fifty dollars, invested in the best agricultural works in the English language, may save him thousands in the end, and double his profits in two years. The Agricultural Journals of the United States abound in information most useful to the practical farmer: and the back volumes, if collected and bound, will form a library of great value.

Rotation of Crops in connection with Wheat Culture.

A system of tillage and rotation which will pay best in one locality, or on one quality of soil, and in a particular climate, will be found not at all adapted to other localities, different soils and latitudes. Hence no rule can be laid down that will meet the peculiar exigencies of a farming country so extensive as the thirty States east of the Rocky Mountains. There are soils in Western New York, known to the writer, which have borne good crops of wheat every other year for more than twenty years, and produce better now than at the beginning of their cultivation. The resources of the earth in supplying the elements of wheat and corn are extremely variable. There are friable shaley rocks in Livingston county, N. Y., which crumble and slake when exposed to the air, that abound in all the earthy minerals necessary to form good wheat. These rocks are hundreds of feet in thickness, and have furnished much of the soil in the valley of the Genesee. The Onondaga Salt Group, and other contiguous strata, which extend into Canada West, form soils of extraordinary capacity for growing wheat. Indeed, the rocks and "drift" of a district give character to its arable surface.

Nothing is more needed at this time than a good geological map of the United States, accompanied by an accurate and popularly arranged work on agricultural geology. The writer had hoped to give such a map in this report; but it is thought best to devote another year to the collection of geological surveys and facts, and to the making of more critical and extended researches before publishing.

In the matter of rotation of crops in connection with wheat culture, clover and corn are generally preferred in all the Northern, and most of the Middle States. In New York, Ohio, Pennsylvania, Michigan, Wisconsin, Northern Indiana, and Illinois, so far as the writer is acquainted, a crop of wheat is made in rotation, either every third, fourth, or fifth year. Wherever wool growing is united with wheat culture, clover and wheat are the staple crops of the farm. Wool and superfine flour are exported; farmers taking nearly all the bran and shorts of the millers who purchase their wheat. The offal of wheat makes not a little feed with chaff and cut straw. Many agriculturists grow peas, beans, turnips, beets, and carrots in large quantities, as well as clover, corn, oats, and barley. Peas and beans, both vines

and seeds, when well cured, are excellent feed for sheep; and on good land they are easily grown. They fit the soil well for wheat.

All the manure derived from sheep is husbanded with extreme care by farmers who are gradually enriching their lands. On a deep, rich, arable soil, quite a number of sheep may be kept per acre, if highly cultivated; and their manure prepares the land for producing generous crops of wheat at a small expense. Of all business men, farmers should be the closest calculators of *profit* and *loss*.

Great care should be taken to sow good and clean seed on clean land. Previous to putting the seed in the ground (drilling is preferable to sowing broad-cast) wheat should be soaked five or six hours—not longer—in strong brine. After this, add a peck or more of recently slaked lime to each bushel, and shovel it over well, that the lime may cover each seed. It is now ready to commit to the earth. Most good farmers roll the earth after seeding; some before.

In the Southern States, planters are in the habit of permitting their wheat to remain too long in the field after it is cradled, and in small shocks. Good barns are too scarce in all the planting States, and in some others.

Summer fallowing is generally abandoned, except in cases where old pastures and meadows, new prairie, or bushy bad fields are to be subdued. As a general rule, friable soils need not be ploughed long before the intended crop is expected to begin to grow. Among fertilizers, wood ashes, salt, bones, lime, guano, and poudrette have been used in wheat culture with decided advantage. In Great Britain, manure derived from the consumption of turnips and other root crops by sheep and neat cattle, is much used in preparing land for wheat. Sheep, clover and peas, corn and hogs, *rotate* well to insure the economical production of this staple. Manure is usually applied to the crop preceding wheat.

It may be interesting to some readers to see in this place the mean result of several organic analyses of wheat made by M. Boussingault. Wheat, dried at 230° degrees *in vacuo*, was found to contain:

Carbon	46.1
Oxygen	43.4
Hydrogen	5.8
Nitrogen	2.3
Ash	2.4
Total	100.0

Charcoal may be regarded as a fair representative of *carbon*, and water as the representative of both oxygen and hydrogen. It will be seen by the above figures, that over 95 per cent. of wheat is made up of elements which greatly abound in nature in an available condition; and the same is true of all other plants. It is doubtless owing to this circumstance, that a comparatively small quantity of guano and other highly concentrated fertilizers are able to produce crops five, ten, and fifty times greater than their own weight. Azote, or nitrogen, in the form of ammonia, or nitric acid, (aqua fortis,) and the incombustible part of plants are the elements which least abound in soils, and should be husbanded with the greatest care.

THE WHEAT CROP OF THE UNITED STATES. By Hon. C. P. Holcomb, of Delaware.

A short wheat crop in England, Mr. Webster says, affects the exchanges of the civilized world. In the vast increase of population in the absence of long wars and famines, the importance of this staple is constantly increasing. Its cultivation is the most attractive and pleasant of all descriptions of husbandry; and its rewards are generally remunerating, when the soil and climate are favorable, and the markets are not too distant.

It is important to know what our relation is to this staple of the world, and what is, and what is likely to be, our contribution to the great aggregate of production. Beyond feeding our own great and rapidly increasing population, it probably will not soon if ever be very great. It is a mistake, I apprehend, to suppose our country is naturally a great wheat-producing country. The wheat district at present, in comparison to the whole extent of our territory, is limited. It is confined, so far as any appreciable amount is grown, to about ten degrees of latitude and twenty degrees of longitude, and embracing about one half the number of the states. The crop of 1848 is estimated by the Commissioner of Patents, at one hundred and twenty-six millions and our population at twenty-two millions. This gives a less number of bushels, per head, to our population than the consumption of Great Britain, which is generally set down at one hundred and sixty millions, or six bushels to each inhabitant. But with us Indian corn is a great substitute; so are potatoes and oats in Ireland and Scotland. Still our consumption of wheat, including the black population, is undoubtedly less, per head, than theirs. But in the absence of any certain data, to ascertain either the actual production, or our consumption, our only safe course is to take the actual excess, or the amount exported, after supplying our own wants. This, for the fiscal year 1848, being the crop of 1847, amounted, in flour and wheat, to twelve millions two hundred and ninety-four thousand one hundred seventy-five bushels, although Mr. Burke's figures would show a surplus of some forty millions! That there was not, and never has been any such surplus in the country is very evident, for the foreign demand was all the time good, and drew away all we had to part with.

The crop of 1848 was, undoubtedly, one of the best and largest we have ever grown; yet I have ascertained, by application at the Register's office, that the exports for the fiscal year 1849, amounted in wheat to but 1,527,-534 bushels, and in flour to 2,108,013 barrels, or less by 226,676 bushels than the exports of 1848. Twelve millions is comparatively a small surplus in a favorable season, for a country with a population of twenty-two millions of inhabitants. The loss of a small per cent. in an unfavorable season would at once sink this excess.

There is in this connection, just now, another important matter to be considered. According to Professor Tucker of the University of Virginia, in his work on the *Progress of Population and Wealth in the United States*, the emigration to the country, from 1800 to 1840, amounted to about one million. The arrivals at New York alone, in the first eleven months of this year, were two hundred and thirty thousand four hundred and thirty-three, almost equal to *one-fourth* the number that came in the preceding *forty years*. I have endeavored to obtain the arrivals at other ports, and the aggregate within the last four years, but my correspondents

have not responded in time. But the number this year, will probably be found to be little, if any, less than four hundred thousand persons!

A single year brings to our shores, a number equalling the annual increase of the population of England, which Mr. Colman puts at four hundred thousand, or a number more than equal to the population of the largest city in the Union, and all are to be fed on wheaten bread, for as to Indian, "they'll none of it." An additional two or three million bushels of wheat finds a *certain* market in feeding the "grand army." But it may be said, that these masses, thus annually rolling upon our shores—a stream that seems to be exhaustless, pouring on and swelling with a constantly increasing volume and current—soon, on their arrival, become themselves producers. To some extent they do, but by far the largest portion of them go into our towns and manufacturing villages, and upon our public works.

According to some, our population, without reference to this *mass*-emigration, is likely to double within the next twenty-five years. Suppose the production to be one hundred and twenty-six millions, which is undoubtedly a high estimate, and our consumption and seed to be now one hundred millions, we shall have to increase the crop seventy-four millions by 1874, an amount falling but about ten millions short of the whole produce of the country as exhibited by the census of 1840.

Again, our last census exhibited the striking, and to many surprising, fact of the concentration of our population into towns and villages—the disproportionate increase of these over the rural districts. In some of the States, the *only* increase was in the towns, as in Rhode Island, Connecticut, Delaware, and Maryland. "In Massachusetts more than half the increase took place in the nine principal towns. Even in the great Agricultural State of New York, the whole increase was twenty-seven per cent.; in the fourteen largest towns, sixty-four and a half per cent.; in the State, exclusive of these towns, but nineteen per cent. In Pennsylvania, the gain in nine towns, thirty-nine and a quarter per cent.; in the State, but twenty-one and three-quarters per cent. In Ohio, the fifteen largest towns increased one hundred and thirty-eight per cent., the State but sixty-two per cent."—(*Macgregor's Progress of America,*) &c. The approaching census will undoubtedly show a still larger proportionate increase in the towns and villages.

It is notorious that *farm* laborers do not seem to increase; they are everywhere scarce, and the demand for their labor in the towns and manufacturing villages enable them to command high wages. Farmers can with difficulty obtain sufficient laboring-men, or servant-women for their kitchens, notwithstanding the almost half-million of arrivals! A portion certainly go to the West and clear up farms, but not a number, one-half or one-tenth, sufficient to supply at first, those who go to the cities, manufacturing villages, and upon the public works. The inference is, that any small surplus of wheat we may raise, or any probable augmentation of the crop, will be consumed by these additional *customers* of the farmer, and our otherwise rapidly increasing population.

Let us now notice more in detail, the different sections of our country as adapted to the growth of wheat.

The New England States, some of them aided in their recent enterprises by bounties offered by the State Governments, have failed to insure such success as is likely to encourage them to continue the culture of wheat; or at all events, to induce them to aim at increasing their product to any considerable extent, since, as one of their own farmers candidly states, "the attempt to grow a crop of wheat is an experiment."

The States south of North Carolina, and inclusive of a part of this State, have never heretofore succeeded in growing wheat to any considerable extent, though there were periods in their history—before the general introduction of the culture of cotton—when, if it had been practicable to make this cereal one of their staples, they would certainly have done so. Besides the common dangers from rust, and blight, the fly, and sometimes the frost—as the past season—they have a most formidable enemy in the weevil. In Upper Georgia, in the Cherokee country in particular, wheat will probably be cultivated to some extent, and a limited cultivation of it by the planters for their own use will probably continue in several of the Southern States. But the cotton, rice, and sugar States, like the manufacturing States of New England, will not soon, if ever, add much to the supply of wheat; the rich staples of the former and the varied husbandry and grazing of the latter, suited to supply the immediate wants of a manufacturing population, will be likely to receive their attention in preference.

Kentucky and Tennessee, though their agricultural history dates back beyond the settlement of the north-western States, have already been out stripped by at least two of them. In neither of these States has the culture of wheat ever been put forward, and regarded as one of their best staples, or as very favorably adapted to their soil and climate. Still, notwithstanding the formidable danger from rust, the production of Tennessee is estimated to be equal to nine bushels to each person, and Kentucky about seven and a half bushels. Missouri may be classed with Kentucky and Tennessee, which she much resembles in soil, climate, and productions, except that she raises much less wheat than either, her crop being placed by the Commissioner of Patents at only two millions, or less than four bushels to each resident of the State. But, besides that the experience of the past discourages the idea that these fine States are likely to become great wheat-producing States, the fact that the staple of cotton may be cultivated over a considerable portion of one of them, and that hemp and tobacco are among the valuable products of the other two; that Tennessee is the very largest corn-producing State in the Union, showing her soil and climate are particularly adapted to this description of grain, and that Kentucky and Missouri are unsurpassed as grazing countries, and there is little ground to suppose that any change in their husbandry will very greatly or suddenly augment the production of wheat. Let us come now to the States of Indiana, Illinois, Wisconsin, and Iowa, and that *fabulous* wheat district or territory to the west of these again, from which, according to the vaticinations of some, may be drawn supplies of wheat to feed the population of both Europe and America, or fill warehouses that would sustain our people through a longer famine than that which afflicted the people of Egypt! I cannot help thinking, that, to some extent, this generally fertile district of country has, so far as the production of wheat is concerned, been "shouted forth in acclamations hyperbolical." My own impression in regard to it is, including the States last named, derived in part from observation, from intercourse and correspondence with intelligent agriculturists of these States, and from a careful examination of a geological survey of two of them, that the soil and climate of this whole district of country are *not* particularly favorable to the production of wheat. The popular idea I know to be otherwise. I am not going to dwell upon it, or to examine the subject

at any length. There is a single remark that may help to explain the reputation that has gone abroad in reference to the wheat-producing qualities of these lands. The prairie sod, when first broken up, generally produces wheat well, often most abundantly, provided it escapes the rust, insect, &c. But, when this ground has been much furrowed, becomes completely pulverized by exposure to the atmosphere, the light and friable mould, of which most of it is composed, drenched, as a good deal of it is, at times, with surface water, fails to hold or sustain the roots of the plant, it is thrown out, or winter-killed; and "winter-killed," "winter-killed," "winter-killed," we all know, is among the catalogue of disasters that almost annually reach us. Sometimes, when escaping the winter, the high winds of spring blow this light soil from the roots, exposing them to such an extent, that, in a dry time in particular, the wheat often perishes. When breaking up fresh prairies, there was much encouragement and promise of hope, but which, I believe, has not been, nor is likely to be, realized by their husbandmen, in the degree that early experiments induced them to look for.

As appears by the last report of the Commissioner of Patents, the crop of Illinois, in reference to population and production, is below that of Kentucky, and both Indiana and Illinois is below that of Tennessee. The crop of Indiana is set down at 8,500,000, her population at 1,000,000, or equal to 8½ bushels ahead. The production of Illinois is stated at 5,400,000, her population at 800,000, or less than seven bushels to each inhabitant—and both these "fair and fertile plains" are still farther behind the old "battered moors" of Maryland and Virginia.

Much of their wheat, too, is spring wheat, sown often on land where the fall crop had winter-killed, increasing the number of bushels much more than the value of the crop. I have heard it estimated that full one-third of all the wheat shipped from Chicago was of this description. Chicago is their great wheat depot. Several millions of bushels are shipped from this point, *the contributions from parts of three States,* Wisconsin, Indiana, and Illinois, and which concentration of their joint product at this new western city, or something else, seems to have imparted to each and all these States the reputation of great wheat-growing States, though they are in fact, with the advantage of a virgin soil, behind several of the Western States, and two at least of the Eastern or Atlantic States. The geological explorations of the Hon. Robert Dale Owen, undertaken under the authority of Congress, throws much light on the character of the soil of Wisconsin and Iowa, and the description given undoubtedly characterizes much of that region of country. The specific gravity of the soil, Mr. Owen states to be remarkably *light;* but what he represents to be a "striking feature in the character of the Iowa and Wisconsin soils, is the *entire absence, in the most of the specimens, of clay, and the large proportion of silex.*" Again he speaks of their being particularly adapted to the growth of the sugar-beet, which he truly says, "flourishes best in a *loose fertile mould.*" Again, he detected no phosphates; but they might be there, as the *virgin* soil produced good wheat. So does the virgin soil of most of the prairie land.—"The soil was rich in geine," &c. But I submit that this does not describe a wheat soil, hardly in any one particular. Liebig tells us, that "however great the proportion of *humus* in a soil, it does not necessarily follow it will produce wheat"—and cites the country of Brazil.

Again, he adds, "how does it happen that wheat does not flourish on a sandy soil, (which much of the soil of these States is described to be,) and that a calcareous soil is also unsuitable to its growth, unless it be mixed with a considerable quantity of clay?"

The late Mr. Colman, in his *European Agriculture,* states, that "the soil preferred for wheat (in England) is a strong soil with a large proportion of clay." But the question after all is, not whether these States cannot grow wheat, and in comparatively large quantities, for we know that while their lands are fresh, they can and do—but whether, considering the hazard of the crop from winter-killing, the rust, the fly—the risk from the two former being equal to a large per cent. premium of insurance, they are not likely to find their interest in grazing, in raising and feeding stock, instead of attempting to extend their wheat-husbandry. Lord Brougham has said, that grazing countries are always the most prosperous, and their population the most contented and happy. The meat markets of Great Britain are likely to prove better, and more stable for us, than their grain markets.

The Hon. Henry L. Ellsworth, a distinguished citizen, and large farmer of Indiana—distinguished throughout the Union for his zeal in the cause of agriculture—thus expresses himself on this subject: "After a full consideration of the subject, I am satisfied that stock raising at the West is much more profitable than raising grain. Indeed, an examination of the north-western States shows a vast difference in the wealth of the grazier over those who crop with grain. The profits of wheat appear well in expectation, on paper, but the prospect is blasted by a severe winter, appearance of insects, bad weather in harvesting, in threshing, for there are but few barns at the West, or transporting to market, or last, a fluctuation in the market itself."

Such is the opinion of Mr. Ellsworth, the result of observation and experience, himself largely interested in ascertaining the safest and surest course to be pursued. The destiny he has indicated for this beautiful, fertile region of country, will undoubtedly be fulfilled; it will become a great pastoral, stock-raising, and stock-feeding country.

Ohio stands now, as she did at the census of 1840, at the head of all the wheat States, in the aggregate of production; her crop of 1848 being estimated at 20,000,000, which is about equal to 10½ bushels per head of her population. The geological survey of this State, and the character of the soil, as described in the Reports of the Board of Agriculture, in a large range of her counties, as a "clayey soil," "clayey loam," "clay subsoil," &c., shows Ohio to possess a fine natural wheat soil, if indeed, after thirty years of a generally successful wheat husbandry, such additional testimony or confirmation was necessary. I am not in possession of all the reports of her Board of Agriculture, but if I mistake not, it was stated in one of them, that Ohio had already reached her maximum of production, until an improved husbandry should be introduced, to advance it still further.

Michigan has also been successful in the cultivation of wheat. Her burr-oak openings are unsurpassed in producing wheat. They are intervening ridges between low grounds, or marshes and bodies of water, and their location not generally considered very healthy. A doubt has also been suggested as to whether this soil, being a clayey loam, resting on a sandy and gravelly subsoil, is likely to wear as well as some other portions of the fertile soil of the State. The Commissioner of Patents puts her crop for 1848 at 10,000,000 of bushels, which is equal to 23½ bushels to each inhabitant! By the census of 1840, the population of Michigan was 212,267; number of bushels of wheat, 2,157,108. Her population in 1848 is estimated at

412,000. While she has barely doubled her population, she has, according to the above estimate, more than *quadrupled* her production of wheat—increased it at the rate of about one million of bushels a year for eight consecutive years, making the quantity she grows to each head of her population, *more than double* that of any State in the Union. This *may* all be so, but we shall soon have the *record*, the census of 1850; that will be more reliable than the estimates of our sanguine friends; we must call for the record; it will be more satisfactory than the *ciphering*. Michigan has probably more to fear from the winter than Ohio; and in reference to all of the States west of the Alleghany, the contingencies attending the crop from winter-killing, and rust in particular, are much greater than on the Atlantic slope. The cause with them, too, is atmospheric, and the elements may not be controlled; and no decided amelioration may, perhaps, be expected, varying, however, as the seasons are more or less favorable from year to year. While we are not altogether safe from peril from the same causes, the danger is much less. The fly, of late, in our Atlantic wheat States, is regarded as our worst enemy. But the fly has its enemies, which may overtake and destroy it; or a change of seed is sometimes a preventive; while high cultivation insures, to a certain extent, against its more serious ravages.

We can at least say, and appeal to the past history of the country to show it, that for a period of more than one hundred years, the supply of the Atlantic wheat States has generally been constant, and for the most part abundant. They have furnished the "staff of life" to several generations of men, and, cotemporary with it, an annual amount for export, that materially assisted in regulating the exchanges of the country.

Yet are these *nursing mothers* of the old thirteen thus *flatteringly* noticed by one of the "commercial writers," and which is copied into Macgregor's work on this country!

"In all the old wheat districts of Delaware, Maryland, and Virginia, the land is all so completely exhausted by continued cropping, that it must be abandoned for years, until restored to vigor by the recuperative powers of nature, or transferred to another population better qualified to recover it by art and industry."

Not a single *biscuit*, it will be seen, is to be expected from us! The eyes of this commercial writer were evidently "Westward, ho!" The "Great West" would have to grow the wheat; for she could grow corn, and fat hogs, and could surely furnish the *bread* as well as the *meat*—provide the whole bill of fare!

But however this writer may have reasoned, possibly he had in view, and was dazzled, as some others seem to have been, by the Chicago wheat granaries. But however he may have reasoned, had he taken the trouble to have informed himself, he would have ascertained that *two* out of the three of these thus "disfranchised" States were, at the time this statement was made, (1842,) excelled but by *two* other States in the Union in the production of wheat, in the ratio of production to population. The crop of Virginia is set down, in 1838, at 12,250,000; her population, 1,295,000, which is equal to nearly ten bushels to each inhabitant; while the crop of Maryland is estimated at 5,150,000—her population, 510,000; the ratio being a little over ten bushels a head. In Delaware it is about seven bushels; and I repeat, that even taking the joint production of the three States, and their aggregate population, and Michigan and Ohio alone excel them as wheat-growing

States. So much for the opinions and views of men who sit in their counting-houses and write about "The Crops."

In an interesting "Report on the Breadstuffs of the United States," dated at Rutgers College, by Lewis C. Beck, M. D., that appears in the last Patent Office Report, the wheat district of the country is also mapped, or indicated as lying to the West. But Dr. Beck includes *western* New York and *western* Pennsylvania, and very properly; but why not *eastern* New York, and *eastern* Pennsylvania? for the crop of New York is 15,500,000, or 5½ bushels to each person: the crop of Pennsylvania, 15,000,000, or six bushels to each inhabitant; while a large portion of their population are engaged in commerce, manufactures, and the m[illegible]

That our land, particularly in the lower wh[illegible]ates, has been hard cropped, there is no doubt. That much of it requires renovation, there is as little doubt; and just as little, that the farmers of Delaware, Maryland, and Virginia are engaged in *earnest* in effecting this change. They have at their command the powerful fertilizing agents, *lime* and *marl*. They are applying one or both of these in *immense quantities* to whole districts of country. New Jersey and North Carolina, though neither of them large wheat-producing states—but in North Carolina the quantity is very much increasing—are participating in these efforts at improvement. The concentrated manures, particularly guano, find now a ready and large market throughout our whole section of country; and I do not agree, every thing considered, soil, climate, markets, price of land, that the West, or *any portion of the West*, has any great advantage over us—in fact, any advantage at all. And such *exclusive* claims as are set up for her, so far as wheat husbandry is concerned, I believe to be unfounded, and that our wheat fields will be the last place we shall be driven from. Still, nobody under-estimates the teeming prolific West. Let her hang out her cornucopia; it is her just emblem. But let it be understood that we, of the *old thirteen*, expect still to *raise our grist for the mill*, and, possibly, with the smiles of a kind Providence upon us, may have a few *bakings to spare*. We neither expect our "completely exhausted lands will be abandoned for years," nor do we consent to be *ostracised* from them by commercial writers, that they may be "transferred to another population better qualified by art and industry to improve them."

But it is never in good taste to talk too much of ourselves, and boast too much of what we are, and what we can do. I prefer letting a western agriculturist speak for us. No man is, perhaps, better informed on the agricultural resources of this country than Solon Robinson; no one knows the country better, or, I believe, so well; for in his zeal in the cause, there is little of it he has not explored and *personally* examined; while no man is more independent, candid, and fearless in expressing his opinions, affect whom they may. Mr. Robinson, in speaking of the wheat crop and wheat district, recently said:

"In southern Indiana, Illinois, all of Kentucky, Tennessee, and northern Missouri, it is affected by the rust. It is the most precarious crop in the West, and altogether unsafe for the farmer to rely on. Grazing is likely to engage the farmer of the West. I consider *Delaware*, *Maryland*, and *Virginia* the best wheat States in the Union. I saw one thousand acres of wheat in Virginia, last season, better than any one thousand I ever saw in the West. *Lime*, *plaster*, and *clover* will bring wheat on any of the exhausted

lands of these States, and make it a more reliable crop than in any of the Western States."

This opinion of Mr. Robinson should encourage our farmers to renewed efforts. It is more with this view, I hardly need say, than to defend against any attack from any quarter, or to try any issue between the old wheat States and the new, that the opinions of these western gentlemen, Mr. Ellsworth, and Mr. Robinson, are cited. All the wheat fields and all the grazing pastures are alike within the borders of our happy country, and her husbandmen and graziers are brethren of one family. Let us, then, in this spirit of a generous emulation, press forward. A portion of the West may, in this spirited race, have a little the heels of us; but the *old nags* will be sure to come up to the *score;* they'll pay no *forfeit;* and it will be time enough when the race is run, to say who wins; who's beaten, and who has been distanced.

But the encouragement to all is great, for the demand must go on rapidly increasing; and it is only by an improved husbandry that it will be adequately supplied. The foreign market, on the terms it can now be reached, is of great value to us, as generally receiving any surplus we may have to spare at remunerating prices: but it is not always this will be on hand; and I venture to predict that the *present* will be found to be one of those years, as I agree with one of our most intelligent and best informed Brandywine millers, Mr. Lee, "that the price of wheat and flour will have to advance to the point of preventing any considerable exports, or before next harvest it will be found we are short, and the price will go up very much."

C. P. HOLCOMB.

New Castle, Del., Dec. 15, 1849.

(American Farmer.)

CORN.

"What varieties most esteemed, and for what reasons—what the difference in time of ripening—is it liable to change of character and qualities according to soil and climate, and other influences, and your observations on that point—give the estimated value of the shuck as compared with the blade, and of both as compared with good hay, weight for weight—what is the value of green corn for soiling cattle, and especially for producing milk—your experience as to feeding grain, whole or ground, cooked or raw." [*Circular.*

The following extracts from replies received in answer to the above circular, will be read with interest: as they contain much valuable information on the subject of Corn Culture, derived from the experience of agriculturists in all parts of the country:

EASTERN STATES.

Mr. Temple Cutler, of Hamilton, Mass., writes as follows: "So long as we select the earliest and ripest ears of corn for seed, and plant only one kind in a field, it does not change its character."

Mr. C. has been making experiments on the relative value of the upper half of corn stalks, including the leaves, as compared with good hay. "When early cut and properly cured," he says, "the forage thus obtained is equal to timothy or other hay. My method is to cut and get them in the same day, in fair weather: giving them only a little time to wilt in the sun. In the barn, I place them on poles, in good ventilation, where they will keep perfectly sweet, and of a green color. Cattle will eat blades and stalks thus cured, with great avidity, leaving not a stalk behind. Cows will give more milk when fed on these than on the best clover hay, and I am confident they contain more fattening properties. By experience I have been taught to set a high value on green corn (stems and leaves of young corn) for producing milk in cows: and it is also highly valuable as the best and most convenient article for soiling cattle. It may be planted in drills, or sown broad-cast, at different times, so as always to have a crop in the proper stage for use. I have made careful and accurate experiments in the above subjects, and have ascertained, by weighing the top stalks, that an acre producing 45 bushels of corn will yield 2000 lbs. of dry stalks, cut above the ears. The lower part of the stalks will weigh still more, if cut and cured in a similar way. Our farmers generally reckon the manure and cultivation devoted to an acre of corn as worth $20. The average yield per acre, in this vicinity, is on the increase: being now from 40 to 60 bushels. This result is attained by deeper ploughing, and spreading more manure on fewer acres of land." The suggestions of Mr. Cutler, in reference to the curing of fodder, are important to farmers who cultivate small crops of corn. Green corn, cut for soiling, should be partly cured by drying, before fed to cows or other animals. The proper stage for cutting is when the seeds begin to form, for then the organized elements of the kernels, or seeds, are diffused throughout the whole plant. These young plants contain 88 per cent. of water, which is too much for health—they should therefore be partially cured. Potatoes and green clover contain about 75 per cent. of

water, which is enough for any green food to have, when fed to animals. All forage plants should be cured in the shade, so far as practicable.

Mr. J. M. Merreck, of Wilbraham, Mass., gives the following statement: "The varieties mostly cultivated in this section are the common *eight-rowed yellow*, and the *Dutton* corn—the first is preferred—time of ripening from 1st to 20th September, the *Dutton* being from six to ten days earlier. It is very liable to mix, from other varieties planted near, by the farina from the tassel lodging on the silk of the kind affected. Value of shuck compared with the blade, about 1 to 2. Value for soiling has not been tested in this section. Average yield, per acre, about 25 bushels."

Mr. Aaron Bagg, of West Springfield, Mass., says: "*Eight-rowed yellow* generally preferred, as it ripens earlier, shells easier, has a smaller cob, and less growth of stalk than any other variety. Soil and climate very much modify the character of any particular variety. Value of shucks and blades for fodder, about equal to one-third that of good hay—for feeding to stock the *meal* is much better than the *whole grain*; and *cooked*, better than *raw*. Standard weight per bushel, 56 lbs."

Mr. Allen W. Dodge, of Hamilton, Essex Co., Mass., writes as follows: "The *eight-rowed* variety is preferred, as it ripens soonest, and has less cob than other kinds. The tops and blades, when well cured, are considered of equal value, ton for ton, with English hay. Green corn fodder is extensively raised for soiling milch cows in the latter part of summer, which is often very dry; we could not well dispense with it at that season. It probably yields more, per acre, than any other description of fodder that can be raised, and for producing milk and butter is most excellent. Cows fed on it in August will give nearly as much milk as in the height of feed in June."

Mr. E. T. Morrill, of Atkinson, Maine, sends the following "Estimate of the cost of producing a crop of Indian corn on 20 acres of land:

Ploughing, (in stabble) per acre	$1 00	Yield on 20 acres, 600 bus. shelled corn, worth $1 per bus	$600 00
Harrowing and furrowing, per acre	50	40 loads pumpkins for hogs or cattle	100 00
Carting 10 loads manure, per acre	1 50	Fodder valued at $5 per acre	100 00
Seed, 25 c.—Planting, $1 00 per acre	1 25		$800 00
Hoeing and cultivating twice	3 33	Cost of crop	231 60
Cutting, husking, and shelling	4 00	Profit	$568 40
Cost of crop, per acre	$11 58		
" " " on 20 acres	$231 60		

The variety most esteemed is the large *yellow eight-rowed*; it will ripen in about three months, or three and a half, if the ground is not too rich. I consider corn fodder excellent for soiling, and especially for producing milk."

Mr. S. Hale, of Keene, N. H., writes as follows: "The variety principally cultivated in this vicinity is the *yellow flint*. The greatest obstacle to the culture of this grain here, is late frost in spring, and early frost in fall. Our farmers, therefore, often get seed from the north. Seed brought from Canada, where the season is shorter, and planted here two or three years, produces every year larger kernels, ears, and stalks, and becomes a very valuable variety. A neighbor of mine planted during the last season, on half an acre, a kind remarkable for the number of ears on a stalk. He spread and put in the hills sixteen loads of manure, and the yield was fifty-one bushels. The cobs were small, and the largest number of ears on a stalk was six."

Mr. D. D. Marsh, of Croydon, Sullivan, Co., N. H., says: "Notwithstanding the partial injury from the drought, and the great fears at one time entertained respecting it, the crop of corn in this section has proved an average one. The *eight-rowed Canada* and *Dutton* are the kinds best adapted to this northern climate, as they are two or three weeks earlier than any other corn when acclimated, and become a much surer crop with the same care in cultivation. It is now raised at less expense and in larger quantities than a few years since. Two tons of the shuck or blade are thought equal in value to one ton of good hay. My experience as to feeding the grain whole or ground, cooked or raw, warrants me in giving an opinion decidedly in favor of grinding and cooking, for most kinds of stock."

Mr. Isaac Hubbard, of Claremont, N. H., says: "An experience of more than sixty years has convinced me that corn does best when planted in the same neighborhood for several years until it has become acclimated. We consider it here a very sure crop. The only failure I recollect was in 1816. That year no corn was raised, but small grains were abundant. I prefer the *yellow eight-rowed*, as it ripens earlier, yields better, and exhausts the soil less, than any other kind; average produce 40 bushels per acre."

Mr. Loring Dean, of Manchester, Vt., says: "Corn stalks, when well cured, are worth half their weight of hay. Corn sown broad-cast, and cut green, is very valuable for its nutritive qualities, and for producing milk and butter. I think it adds one-third to the value of the grain to have it cooked and ground before feeding. The usual weight is about 58 lbs., and the yield varies from 20 to 100 bushels per acre; *yellow eight-rowed* the best variety."

Mr. Ariel Thurston, of Hydepark, Vt., writes, that "corn meal *cooked* is of double the value for feeding to stock of the whole grain uncooked. The blades are never stripped from the stalk and fed separate; but the stalks, blades and all, are esteemed at about half the value of hay. The *eight-rowed* is preferred. Some other varieties grow larger and yield better, but are more liable to be injured from early frosts in fall."

Mr. John G. Clarke, of South Kingston, R. I., says, that in that section, the Agricultural Societies and papers have, by diffusing information among farmers, caused more attention to be paid to the culture of corn and other grains, and increased the average product per acre. "There is a new variety," he says, "grown in this vicinity, called the *Philipene*. It was first raised by a colored man near here, who has given it the name. The ears are small, but the grain is firm and hard, and weighs more than most kinds to the bushel. It is a mixture of all colors, but mostly white and yellow. It ripens three or four weeks earlier than most other kinds, and is highly esteemed on this account. The ears increase in size from a few years' cultivation on very rich land; but it will yield more on very poor land than any of the larger kinds."

Mr. Isaac Backus, of Windham Co., Conn., says: "Corn ground, and cooked, will yield much more nutriment than when fed to hogs raw and unground; average value here, $1\frac{1}{4}$ cents per pound. Any land that will produce 25 bushels of corn per acre, by ordinary cultivation, will grow 50 bushels if 500 pounds of guano be applied. It should be put in the hill, but not in contact with the seed."

NEW YORK AND WESTERN STATES.

Mr. Seth Severance, of Oswego Co., N. Y., writes as follows: "Corn is cultivated here to considerable extent. The *Dutton* is in favor with many, as it yields well, produces a large amount of fodder, and is easy to husk from the ears being large. It is, however, a week later than the *eight-rowed yellow*, which is in most common use. The *red blazed* is highly esteemed from its having less stalk and leaves in proportion to the yield of grain, than any other kind: this is very desirable on our damp soils, as it leaves the ground open to the sun's rays. Seed brought from abroad gradually changes its character, and adapts itself to our soil and climate. Thus Canada corn, the ears of which there grow only about 5 inches long, will, after being cultivated here a few years, produce ears of double that length. Corn is to some extent sown broad-cast for soiling cattle, both for fattening and for dairy purposes. It has been raised in this way by a neighbor of mine who keeps 30 cows; he thinks it invaluable for producing milk. Average yield, about 28 bushels, although fields often produce from 60 to 70 bushels per acre. The average is increasing from better cultivation and a manly rivalry among farmers."

Mr. L. Smith, President of the "Sullivan Co. (N. Y.) Agricultural Society," says, "I consider corn-stalks for feed preferable to hay, especially for producing milk. I have practised cutting the stalks fine and scalding them in boiling water, with good success. Steaming would, perhaps, be preferable to scalding, but in this I have had no experience. When prepared in this way, it is the best fodder that milch cows can have, in point of economy and profit. The following crops of corn were offered for premiums at the fair of our society, recently held—one of 115 bushels of shelled corn, one of 100 bushels, one of 90, and one of 80 bushels."

Mr. J. J. Thomas, of Macedon, Wayne Co., N. Y., gives the following as the result of his experience: "Corn-fodder obtained, as it generally is here, by cutting the stalks close to the ground, is about half as valuable as good hay, as cattle will eat only a part of it. But if sown thick for fodder only, the stalks grow small, and are wholly eaten by cattle. A ton of this is more valuable for cows than a ton of hay—being richer, and greatly preferred by them. Late in the summer and early in autumn, it is especially valuable, and adds to the richness and quantity of the milk. It appears to add to, rather than diminish the fertility of the land, as no grain forms or ripens. Of three successive crops, each was larger (without manure) than the preceding one; and the cost of producing did not amount, with me, to over $1.50 per ton—the crop usually yielding 4 to 6 tons per acre of dried fodder. The culture is as follows: Plough the ground, harrow it, and furrow it in one direction, with a one-horse plough; let a man take a ½ bushel hand-basket of seed, and walking rapidly along, strew the corn in each furrow at the rate of 3 bushels per acre. A harrow or cultivator passed lengthwise with the furrow will cover it. Several acres may thus be sown in a day. When the corn is about a foot high, a one-horse cultivator run between the drills is sufficient; the growth of fodder smothering all weeds, obviating the necessity of hoeing, and leaving the field in autumn as clean as a floor; hence this crop is an excellent weed-killer. It may be sown in the summer after the usual time of planting corn, and harvested (by mowing or with the sickle) early in autumn. It is best bound in bundles and placed in

large shocks to dry—great pains should be taken to have it thoroughly dried before stacking; and it is often best to leave it standing in the shock until winter. Corn for fodder sown *broadcast* is worthless as a crop, compared with this mode; needing more seed, and leaving the ground foul. By careful experiment it was found, that sown at the rate of 20 stalks to the foot in the drill, only ⅓ the amount was produced, compared with 40 stalks to the foot. Hence plenty of seed should be used. These observations are founded wholly on several years' personal experience, and it is believed that this crop will yet form a very important one, from lessening, in a great degree, the amount of meadow lands needed, and forming an enriching fallow crop."

Mr. Nathan Dustin, of Delaware Co., Ohio, says: "Corn is the great staple in Ohio. In this middle section of the State, a grade between the *gourd-seed* and *yellow-dent* ripens best—and yields oftentimes 50 bushels per acre—it is best ground for cattle and cooked for hogs."

Mr. John Kuhn, of Ashland Co., Ohio, says: "Shuck and blades, weight for weight, are worth as much, or more than the best of hay, for cattle. Grain ground and cooked saves one-third in feeding to all domestic animals."

The following estimate of the cost of cultivating an acre of corn is from Mr. David Bush, of Delaware Co., Ohio:

"Interest on land, $20 per acre	$1.20
One ploughing, with double team	1.00
Harrowing and working	0.75
Seed and planting	0.50
Working three times with cultivator	1.50
Hoeing once	0.60
Harvesting and husking	1.25
	$6.80

Average yield per acre, 48 bushels. Cost of production, about 14 cents per bushel."

From Xenia, Ohio, Mr. Alexander Ruff writes as follows: "The yellow varieties are most esteemed for distilling, and fattening stock; the white is preferred for bread and other purposes. The shuck is estimated at one-third the value of the blade. The blade, well saved, is about equal in value to second-rate hay. My experience in feeding ground grain to milch-cows is, that it is a saving of at least one-fourth, besides keeping the cows in better condition, and adding to the quantity and quality of milk. I have tried corn-meal cooked for fattening hogs, and estimate that one-half the quantity of raw corn fed to hogs would, if cooked, produce more pork. Corn is here considered a certain crop; and the cost of production is about 20 cents."

Mr. C. S. Chase, of Racine, Wisconsin, says: "*Dent* corn is much esteemed for its great productiveness. The length of the season here usually allows this variety abundant time to ripen. The husks and stalks are very little used for fodder. Corn should be ground and fed raw to cattle, and cooked for hogs. Had we a mill for grinding corn on our farms, we should use the meal altogether. A machine called a corn-grinder has recently been invented by Mr. Whitney, of this place. I have seen it in operation, and think it will prove of great value to farmers all through this country."

Mr. O. Perkins, of Burlington, Wisconsin, writes that "the cultivation

of corn is becoming a matter of prime importance with the farmers of Wisconsin, as well as of Illinois. It is a very certain crop, and 40 bushels per acre can be depended upon, except in the case of very late varieties, which are sometimes cut off by the frost. This happened in 1848, when a severe frost in the fall destroyed the vitality of some late kinds, which are too much cultivated in this State. This year the corn is all sound and heavy. The large southern varieties gradually become acclimated, after having been grown here several years in succession; and grow smaller and ripen earlier."

Dr. John Little, of Cass Co., Ind., sends us the following: "We have an almost endless variety of corn cultivated here. I prefer the *white flint* for sandy land, and the *yellow flint red-cob* for our rich river bottoms; the former being most esteemed for making bread, the latter as food for animals. Both are liable to change of character, if cultivated together, or near each other. The average product for several years, with me, has been 50 bushels per acre."

Mr. A. B. Florer, of Newport, Ind., says: "Notwithstanding the prejudice against it, there is more real value in corn, as food for man, and for fattening animals, than in any other grain. The *yellow* variety best suits our climate, (40° lat.) It ripens two weeks earlier, and comes to greater perfection, although it does not grow as large as some other kinds; average yield, about 50 bushels; weight, 55 lbs.; cost of cultivation, about $5.00 per acre."

Mr. John Bell writes from Floyd county, Ind., as follows: "Varieties here are very numerous, owing to their mixing, or hybridizing with each other, when in adjoining fields. The kind usually preferred is the *white flint*, large ear, deep grain, and small cob. This variety is best adapted to our climate, the seasons being long enough to bring it to maturity. Our earliest kinds ripen about the last of July, while later sorts require the whole season; the latter generally yield the best."

Mr. Wm. A. Hacker, of Jonesboro', Ill., writes: "Corn is our great staple here, on the verge of the 'American bottoms.' The quantity raised is immense, and is mostly shipped south to New Orleans, and thence to Europe. This season having been an unusually wet one, the yield will be indifferently good. 'A dry June' always results, in this section, in an abundant crop; produce per acre, from 50 to 75 bushels. The blade and shuck are not used to any extent here as fodder. Green corn, for soiling cattle, is very valuable, and produces more milk than any other feed, except green clover. My experience in feeding all kinds of grain, and especially corn, is in favor of having it ground instead of whole, and cooked instead of raw."

Mr. Charles F. Ingalls, of Lee Centre, Ill., says: "*Gourd-seed* is the kind most grown in this section; planted the last of April or first of May, 8 grains in each hill, and 4 feet apart each way. Hoe once, and run the corn-ploughs between the rows at least four times during the season; 40 to 50 bushels per acre the average yield. Grinding and cooking increase the nutriment, but for fattening *beef*, would not pay the trouble and expense. I think it would pay, however, for making *pork*."

From Scott Co., Iowa, Mr. James Grant writes as follows: "The *yellow-dent* is the most esteemed variety. It ripens three weeks earlier than the *gourd-seed*, and two weeks earlier than the *white-dent*. In this county we had, during the past year, about 15,000 acres in corn, which has produced 450,000 bushels, averaging 30 bushels per acre."

Mr. B. W. Hawkins, of Portland, Ind., says: "I have found steaming corn in the cob a good plan, and a saving of at least one-fourth, especially when fed to milch cows. The shucks are very valuable as fodder for cattle and horses."

MIDDLE AND SOUTHERN STATES.

Mr. R. L. Colt, of Paterson, N. J., says: "I use many acres of corn, sown broadcast and cut green, for my milch cows. I consider this a very valuable crop, as cows, oxen, and even hogs, eat the green stalks with avidity. If we have a thousand bushels of *corn*, we have also a thousand bushels of *cobs*. Now the question arises, Are these cobs of any value as food, or as manure? and if so, what is that value? One man tells me, they are of no account whatever. Another says, he can make as much whisky in December, from a pound of cobs, as he can from a pound of potatoes.—What we farmers want to know is, the nutritive value of the cobs, shuck, and blades; and I think an analysis of each part of the plant, and also of the ashes of each, is worthy of consideration, that we may restore to our land, in part at least, the materials extracted from it by the plant. This would prevent our soil from becoming impoverished by continual culture."

We would refer Mr. Colt, and others who may feel an interest in this very important subject, to the remarks on *Corn Culture* which follow these extracts, and also to the critical analyses of the different parts of the corn plant, by Dr. Salisbury, which will be found in another part of this volume.

Mr. Joseph M. Nesbit, of Union county, Pa., writes as follows: "This is one of the most important crops cultivated in this country, both in regard to profit, and the various useful purposes to which it is adapted. Of the many kinds cultivated here, we prefer the *yellow gourd-seed*, as it yields better than any other. In the selection of seed much care is requisite, in order to preserve this variety in its purity; as in this climate it seems very much to change its character and assume the characteristics of more northern varieties. The product of our good river bottoms will average 50 to 60 bushels per acre. The aggregate quantity produced in this part of the State has increased at least 30 per cent. in the last few years. This is to be attributed to the foreign demand, causing high prices, and inducing farmers to plant more land, and bestow more care and labor on its culture."

Mr. William Carr, of Doylestown, near Philadelphia, says: "My mode is to cut the stalks close to the ground—chop them fine by horse power, and feed them wet, and mixed with meal, bran, or roots, to milch cows."

Mr. William P. Morgan, of Princess Anne county, Va., writes: "Indian corn is the great reliance of Princess Anne farmers—and there has been for several years a considerable increase in the crop. Experience has proved that it is better adapted to our soil and climate than any other grain we can cultivate—average yield 20 bushels per acre. Norfolk is the market for this county."

Mr. Joshua Harris writes from Cabanis county, N. C., as follows: "The crop of 1849 surpasses any previous one made for many years; the season was remarkably favorable, and there was no want of rain from seeding time until the crop was completely made. I have heard of no failure in any direction. It order to secure a good crop and have it produce well, it should be planted four and a half feet apart each way, and in no case more than two stalks to the hill. Our most fertile lands produce 40 bushels per acre; but this is far above the average of the whole."

Mr. Henry C. Helm, of Lincoln county, Ky., says: "The large *yellow* is superior to the *white*, both for distilling and for fattening hogs. It matures 10 to 15 days earlier, thus allowing the farmer to commence feeding to stock that much sooner. I think there is more nutrition in the shuck than in the blade; both are valuable feed for all kinds of stock, especially for cattle and sheep. Ground food for horses and mules, and cooked meal for hogs, would save from $\frac{1}{4}$ to $\frac{1}{2}$ over the common method of feeding whole."

James Williams, of Jackson county, Ala., writes: "In this county corn is our principal crop—more was raised this year than ever before—planted from March until May—harvested from October to December—average yield about 40 bushels—cost of production about 25 *cents* per bushel. A large portion of the crop is consumed in fattening hogs. Pork is worth here about $2.50 per cwt.—20,000 hogs will this year be sent to market from this county."

Mr. E. A. Holt, of Montgomery, Ala., writes: "Corn is our great support for man and beast. A mixed variety of *flint* and *gourd-seed* the best—it ripens about the first of August. A man and horse on our rich prairie lands can make 500 bushels of corn per annum. Its cultivation has been increasing for several years past, but from the high price of cotton it is likely to decrease next year."

Dr. David L. White writes us from Florida, as follows: "After an experience of 27 years, I give a decided preference to the yellow, 12 to 16 rowed. The weevil is less destructive to this than any other kind, and it does well on a thin soil."

Mr. David Taylor, of Sevier county, Ark., says: "Corn should here be planted the first week in March. In this case we are certain of a crop, *rain or no rain*. But if the planting is delayed later, the chances are decidedly against us. *Gourd-seed* is here considered the best variety."

Mr. J. W. Calvert, of St. Francis county, Ark., says: "I have raised two crops of a kind new in this section, called the *Tuscarora*. The kernels are large, and of a reddish-white color, with a red cob. It is remarkable for the size of the ears, which are the largest I ever saw. I have several times thrown out from a pile 75 ears, as they came to hand, that produced a bushel of shelled corn. It is soft and easily crushed, and probably contains much starch, and but little oil; hence it would not be good for fattening animals."

Mr. Prior Lea, of Goliad, Texas, writes as follows: "South-western Texas is a good country for corn; but it requires deep tillage with the subsoil plough, on account of the heat and droughts. There is much difference in opinion as to the best varieties. The average produce per acre about 30 bushels; but more is often made as the first crop on prairie land. The average is increasing with improved tillage, and especially with deep ploughing."

CULTURE OF INDIAN CORN. (*ZEA MAYS.*)

Of the whole family of Cereals, *Zea mays* is unquestionably the most valuable for cultivation in the United States. When the time shall come that population presses closely on the highest capabilities of American soil, this plant, which is a native of the New World, will be found greatly to excel all others in the quantity of bread and meat, milk and butter, which it will yield from an acre of land. With proper culture it has no equal for the production of hay, in all cases where it is desirable to grow a large crop on a small surface.

The Report of the Ohio Board of Agriculture for 1849, for a copy of which we are indebted to M. B. Bateham, Esq., editor of the *Ohio Cultivator*, contains many interesting statements in reference to corn culture, made by the officers of numerous County Agricultural Societies. In Miami county, 2,030,670 bushels of corn were grown, at an average yield of fifty-five bushels per acre. Three varieties are cultivated: the common gourd-seed, for cattle; the yellow Kentucky, for hogs and distilling; and the white, for grinding and exportation. According to the returns from Greene county, which produced 1,250,000 bushels of corn in 1849, "a regular rotation of clover, corn, wheat, and clover again, is best for corn; and no crop pays better for extra culture."

The Harrison County Agricultural Society reports the pork crop at 4,800,000 pounds; and it gave its first premium for corn to Mr. S. B. Lukens, whose statement is as follows:

"The ground had been in meadow ten years; was ploughed six inches deep about the middle of April; was harrowed twice over on the 9th of May, and planted on the 11th, four feet by two feet. It came up well; was cultivated and thinned when ten inches high; three stalks were left in a hill. About two weeks afterwards it was again cultivated, and the suckers pulled off. About the last of June it was again cultivated, making three times the same way, as it was laid off but one way.

Expense of culture, gathering, and cribbing	$17.10
Product, 374¾ bushels, at 31¼ cts.	117.10
Profit on three acres	$100.00"

The evidence on which a premium was awarded was such as should satisfy any one that three hundred and seventy-four bushels were grown on three acres of land, and at a cost not exceeding $17.10, delivered in the crib. This is producing corn at less than five cents a bushel.

Whether the statement be true to the letter, or not, it shows, conclusively, the great value of a *rich soil* for making cheap corn. The Board of Agriculture estimate the crop of Ohio last year at 70,000,000 bushels. Taking the United States as a whole, probably the crop of corn was never better than in 1849. One that has rich land needs only to plough it deep and well, plant in season, and cultivate the earth properly with the plough or cultivator, to secure the growth of a generous crop. On poor soils the case is very different.

To raise a good crop of corn on poor land, and at the least possible expense, requires some science, and much skill in the art of tillage. Take the same field to operate in, and one farmer will grow one hundred bushels of corn at half the cost per bushel that another will expend in labor, which is money. It unfortunately happens, that very skillful farmers are few in number, in comparison with those who have failed to study and practise all attainable improvements. Men who can grow maize on common soil, place the crop in a crib at from six to ten cents a bushel, and pay a fair price for the labor, need not go to school to learn the practical part of corn culture.

There are, however, five or six States in the Union in which this is done. Mr. Lukens has told us how they do it in Ohio; and the practice is very similar elsewhere.

To produce cheap corn on poor land, one needs a clear understanding of what elements of the crop air and water will furnish, and what they cannot supply. It should be remembered that the atmosphere is precisely the same over ground which yields one hundred bushels of corn per acre that it is over that which produces only five bushels per acre. Now the whole matter which forms the stems, roots, leaves, cobs, and seeds of corn, where the crop is one hundred bushels per acre, is not part and parcel of the soil. A harvest equal to fifty bushels per acre can be obtained without consuming over ten per cent. of earth as compared with the weight of the crop. No plant can imbibe more of the substance of the soil in which it grows than is dissolved in water, or rendered gaseous by the decomposition of mould.

The quantity of matter dissolved, whether organic or inorganic, during the few weeks in which corn plants organize the bulk of their solids, is small. From 93 to 97 parts of the dry matter in a mature, perfect plant, including its seeds, cob, stems, leaves, and roots, are carbon (charcoal) and the elements of water. It is not only an important, but an exceedingly instructive fact, that the most effective fertilizers known in agriculture are those that least abound in the elements of water and carbon. The unleached, dry excrements of dunghill fowls and pigeons have five times the fertilizing power on all cereal plants that the dry dung of a grass-fed cow has, although the latter has five times more carbon, oxygen, and hydrogen per 100 pounds than the former.*

Although it is desirable to apply to the soil in which corn is to grow as much of the organized carbon and water as one conveniently can, yet, where fertilizers have to be transported many miles, it is important to know that so much of the manure as would form *coal*, if carefully burnt, can best be spared. The same is true of those elements in manure which form vapor or water, when the fertilizer decomposes in the ground.

Carbonic acid and nascent hydrogen, evolved in rotting stable manure, are truly valuable food for plants, and perform important chemical offices in the soil: but they are, nevertheless, not so indispensable to the economical production of crops, as *available nitrogen, potash, silica, magnesia, sulphur*, and *phosphorus*. These elements of plants being less abundant in nature, and quite indispensable in forming corn, cotton, and every other product of the soil, their artificial supply in guano, night-soil, and other

* Oxygen and hydrogen form water, or are its elements.

highly concentrated fertilizers, adds immensely to the harvest, through the aid of a small weight of matter.

If a moiety of the elements of bread and meat, fruit and garden vegetables, annually consumed by the twenty-two millions of people in the United States, and then thrown away, were judiciously applied to the produce of grain crops, the yearly profits accruing would be many millions. In all sections where corn is worth thirty cents, and over, a bushel, great benefits may be realized by the skillful manufacture and use of poudrette. This article is an inodorous compound of the most valuable constituents of human food and clothing. It is the raw material of crops.

It is not necessary to restore to corn-fields all the matter removed in the crop, to maintain its fertility. A part of each seed, however, ought to be carried back and replaced in the soil, to make good its loss by the harvest.

In every barrel of flour or meal sent to market, (196 pounds,) there are not far from 186 pounds of carbon (coal) and the elements of water. When a bird eats wheat or corn, I have reason to believe, from several experiments, that over 80 per cent. of the food escapes into the air through its capacious lungs, in the process of respiration: and yet, the 20 per cent. of guano left, will reproduce as much wheat or corn as was consumed. Imported guano, which has been exposed to the weather for ages, often gives an increase in the crop of wheat equal to three pounds of seed to one of fertilizer: while it has given a gain of 7 to 1 of corn, and 50 to 1 of green turnips.

Chemists have ascertained that the air expelled from the lungs of man and his domestic animals in breathing, contains 100 times more carbonic acid than it possessed when it entered the organs of respiration.

While carbon, or coal, in bread, meat, potatoes, grass, hay, and straw, consumed by warm-blooded animals, is constantly passing out of the system as carbonic acid gas, the elements of water (oxygen and hydrogen) are also escaping from the lungs in the form of vapor, which in cold weather is often visible. Over 50 per cent. of the solids consumed by man and beast is thus thrown into the atmosphere by a slow, continuous combustion, which generates animal heat. These elements of the farmer's crops fall upon his cultivated fields in rain and dew. Hence, when a pig or other animal eats 100 pounds of corn, and voids by the bowels and kidneys 40 pounds of the matter consumed, these 40 pounds will reproduce 100 pounds of corn again. Even this 40 per cent. of the elements of corn may be reduced one-half by skillful fermentation, by which carbon and the elements of water are still further removed, and then reproduce an amount of grain equal to the original. The art and science of feeding cultivated plants being discussed at length in another place, the subject will not be pursued in this connection.

I am indebted to the valuable work of Professor Emmons, published in two quarto volumes, entitled "Agriculture of New York," for the following and many other analyses contained in this report. The researches into the chemical composition of maize were performed by Dr. J. H. Salisbury, in the laboratory of Prof. E., and were so thorough and extensive as to induce the New York State Agricultural Society to award a premium of $300 to Dr. S. His investigations fill 200 pages in the Vol. Transactions of that Society for 1848.

A corn plant fifteen days after the seed was planted, cut on the 3d June close to the ground, gave of

Water	89.626
Dry matter	10.374
Ash	1.354
Ash calculated dry	13.058

By the above figures it will be seen that nearly 90 per cent. of the young plant is water; and that in proportion to the dry matter, the amount of earthy minerals which remain as ash, when the plant is burnt, is large. This excess of water continues for many weeks. Thus on the 5th July, thirty-three days from planting, their relation stood thus:—

Water	90.518
Dry matter	9.482
Ash	1.333
Ash calculated dry	14.101
(Ash very saline.)	

Before green, succulent food of this character is fit to give to cows, oxen, mules, or horses, it should be partly dried. Plants that contain from 70 to 75 per cent. of water, need no curing before eaten. The young stalk cut July 12, gave over 84 per cent. of water. Such food given for soiling, without drying, would be likely to scour an animal, and give it the cholic.

The root at this time (July 12) gave of

Water	81.026
Dry matter	18.974
Ash	2.222
Ash calculated dry	11.711
(Ash tastes of caustic potash.)	

Ash of the whole plant above the ground, 6.77 grains. Amount of ash in all below the ground, 3.93 grains.

So late as July 26th, the proportion of water in the stalk was 94 per cent., and the ash calculated dry, 17.66 per cent. The plant gained 2136.98 grains in weight, in a week, preceding the 6th September. This was equal to a gain of 12.72 grains per hour.

The rapid growth of corn plants, when the heat, light, and moisture, as well as the soil, are favorable, is truly wonderful. A deep, rich, mellow soil, in which the roots can freely extend a great distance, in depth and laterally, is what the corn-grower should provide for this crop. The perviousness of river bottoms contributes largely to their productiveness of this cereal. A compact clay, which excludes alike air, water, and roots, forbidding all chemical changes, is not the soil for corn.

When farmers sell corn soon after it is ripe, there is considerable gain in not keeping it long to dry and shrink in weight. Corn grown by Mr. Salisbury, which was ripe by the 18th October, then contained 37 per cent. of water; which is 25 per cent. more than old corn from the crib will yield. The mean of many experiments, tried by the writer, has been a loss of 20 per cent. in moisture, between new and old corn.

The butts of cornstalks contain the most water, and the husk or shuck the least, when fully matured and not dried. The latter have about 30 per cent. of dry matter, when chemically desiccated.

Composition of the Ash of the Leaves, at different stages.

	July 19.	Aug. 2.	Aug. 23.	Aug. 30.	Oct. 18.
Carbonic acid	5.40	2.850	0.65	3.50	4.050
Silica	13.50	19.850	34.90	36.27	58.650
Sulphuric acid	2.16	1.995	4.92	5.84	4.881
Phosphates	21.60	16.250	17.00	13.50	5.850
Lime	0.69	4.085	2.00	3.38	4.510
Magnesia	0.37	2.980	1.59	2.30	0.865
Potash	9.98	11.675	10.85	9.15	7.338
Soda	34.39	29.590	21.23	22.13	8.520
Chlorine	4.65	6.020	3.06	1.63	2.664
Organic acids	5.50	2.400	3.38	2.05	2.200
	98.14	97.750	99.58	99.75	99.528

The above figures disclose several interesting facts. It will be seen that the increase of silica, or flint, in the leaf, is steadily progressive from 13½ per cent., July 19th, to 58.65 per cent., October 18th.

Flint is substantially the *bone-earth* of all grasses. If one were to analyze the bones of a calf when a day old, again when thirty days of age, and when a year old, the increase of phosphate of lime in its skeleton would be similar to that witnessed in the leaves and stems of maize. In the early stages of the growth of corn, its leaves abound in phosphates; but after the seeds begin to form, the phosphates leave the tissues of the plant in other parts, and concentrate in and around the germs of the seeds. On the 23d August, the ash of the whole stalk contained 19½ per cent. of phosphates, and on the 18th October only 15.15 per cent. In forming the cobs of this plant, considerable potash is drawn from the stalk; as it decreases from 35.54 per cent., August 16th, to 24.69 per cent., October 18th. When the plant is growing fastest, its roots yield an ash which contains less than 1 per cent. of lime; but after this development is nearly completed, the roots retain, or perhaps regain from the plant above, over 4½ per cent. of this mineral. Soda figures as high as from 20 to 31 per cent. in the ash obtained from corn roots. Ripe seeds gave the following results in their ash:

Silica	0.850
Phosphoric acid	49.210
Lime	0.075
Magnesia	17.600
Potash	23.175
Soda	3.605
Sodium	0.160
Chlorine	0.295
Sulphuric acid	0.515
Organic acids	5.700
	99.175

The above table shows a smaller quantity of lime than is usually found in the ash of this grain. It is, however, never so abundant as magnesia; and Professor Emmons has shown that the best corn lands in the State of New York contain a considerable quantity of magnesia. All experience, as well as all chemical researches, go to prove that potash and phosphoric acid are important elements in the organization of maize.

Corn yields more pounds of straw and grain on poor land than either

wheat, rye, barley, or oats; and it does infinitely better on rich than on sterile soils. To make the earth fertile, it is better economy to plant thick than to have the rows five feet apart each way, as is customary in some of the southern States, and only one stalk in a hill. This gives but one plant to twenty-five square feet of ground. Instead of this, three square feet are sufficient for a single plant, and from that up to six, for the largest varieties of this crop.

Much has been written in the agricultural journals of the country, on the propriety of thin and thick planting. Among the advocates of the latter system, Dr. M. W. Philips, of Mississippi, has been conspicuous, and is understood to be a successful grower of this great American staple.

If one has not a deep mellow soil on which to grow corn, it will pay well to form such a soil by deep ploughing, turning in green crops, and draining if necessary. Few farmers have ever made themselves rich by raising corn on poor land. There is vastly too much of unproductive soils ploughed and hoed in the United States. This practice is bad economy; for it impoverishes the earth, without enriching either the agriculturist or the community. It is so much better economy to grow 100 bushels of corn on two than on ten acres, that a general effort should be made to bring up all corn lands to the average of fifty bushels per acre.

A writer in the *Maine Farmer* estimates the quantity of southern and western corn annually imported into that state for home consumption, at 3,000,000 bushels. No other population, three times as large, out of the United States, consumes an equal amount of American corn. Maine is a great ship-building and lumber-producing State, which makes her an excellent customer for the grain and meat-growing districts of the Union.

The demand for ships, bread-stuffs, provisions, ready-made houses, farm implements, and wearing apparel of every kind, for the California trade and market is operating very sensibly on the agricultural interests of the country. The more its labor becomes diversified, the less danger there is of over-producing any one important crop, like that of corn, cotton, or wheat. It will not do for the productive industry of five millions of agriculturists to be constantly employed on a few leading crops, unless the design is to give a great deal of work for a very little pay, and impoverish the land at the same time.

CORN CULTURE IN MASSACHUSETTS.

CONWAY, MASS., *Dec.* 18, 1849.

SIR:—Your circular of July asking for information on agricultural subjects was put into my hands some months since. Not having the means of furnishing answers to many of its inquiries, I had concluded not to make any reply whatever. With this conclusion I am not entirely satisfied. I have been somewhat successful in the cultivation of *Indian corn* in common with several farmers of this town, and I propose at this late date to give you the mode of culture—with its results—the different varieties of corn in use here, &c.; of which you will make such use, or no use at all, as you see fit. And first, my own experience—premising that we live in a hilly country, and but a small portion of the land is suitable for tillage.

I have on my farm about twenty acres conveniently situated, and fit in all respects for tillage. Till the last twenty years, 35 bushels of corn was considered an average crop per acre for this land. Now it is at least 75 bushels. This increase has been produced mainly by a rotation of crops, and by ploughing in long manure. The manure used is of two kinds.

First: Long manure. This is made from what remains of cornstalks and straw that cattle will not eat, and from *brakes,* mostly from the latter. These materials are used for litter under sheds where cattle and sheep are kept during the winter and spring, and become sufficiently decomposed for use before planting. It is important that this kind of manure should be ploughed under immediately after it is carted on the field, before it has become dry.

Second: Compost manure. This is made in June by mixing one part of stable manure (cow-dung) with two parts of swamp muck, in a large heap of 30 or 35 loads, keeping it under cover. Here it passes through a process of fermentation till November. It is then carted on the ploughed field, and laid in large heaps for use the next spring.*

The manner of cultivation is as follows: From two to three acres of that part of the twenty that produces the least grass, or as we say, "is bound out," is ploughed usually in August. The next spring harrowed, ploughed again from seven to nine inches deep, manured *in the hill* with compost, at the rate of 8 loads per acre, and planted. By a load, I mean 42 cubic feet, or one-third of a cord. The next spring this field has 20 to 25 loads of long manure ploughed in, 8 loads of compost put in the hill, and planted. The third year it is seeded to herds-grass (*timothy*) and clover with oats, or wheat and oats. By taking up from two to three acres annually of grass land, it will be seen that about one-third of the twenty acres is kept under the plough, and that when seeded down it remains in grass six or seven years; the planting is done between the fifth and twentieth of May; the rows three feet four inches apart, the hills two feet six inches. It is hoed three times, a cultivator first passing through the rows.

No hills are made in hoeing, and no weeds should be allowed to grow. I have usually "topped" it about the twentieth of September, and harvested the corn by cutting up the bottom stalks, during the last half of October.

The produce of the turf land—that is, the *first* crop—has been for several years from 60 to 70 bushels per acre. The crop the second year has usually been from 80 to 90 bushels. In some cases, as has been reported by a committee of the Conway Agricultural and Mechanical Association, over 100, and, in one instance, as high as 122 bushels of shelled corn per acre.

It ought here to be said, however, that the measurements of the Society's committee were made during the season of harvesting, and before the corn was sufficiently dry to be fit for market.

The corn is an eight-rowed variety, procured from Canada in 1835, or '36. The ears were small, not more than six or seven inches long—the cob *very small* and kernels large for Northern corn, consequently producing a greater proportion of shelled corn than most other varieties. The ear has gradually increased in size. It is now something more than one-third larger than it was in 1836. It does not ripen so early, but has never been injured by frost.

* Our correspondent commits an error in hauling his manure to the fields in the fall for spring use, unless he covers the heaps, however large, to protect them from washing and leaching rains, and water from melting snow.

This change in the size of the ear and in the time of ripening shows that climate has an influence on the character of corn.

I am aware that much larger crops are grown in many parts of the country. I give the result of my mode of culture—not because the crop is large, but because it shows how any farmer, with such fertilizing materials as his farm affords, may improve the quality and increase the produce of his lands.

I am aware too, that a better rotation would be—first corn, second wheat and oats—seeding with herds-grass and clover; third, grass two or three years; then corn again, and so on—being careful to turn under, before planting, a good supply of long manure. But this I cannot do for want of sufficient manure. Consequently the land remains longer in grass, the turf becomes more compact, requiring, after breaking up, two years' cultivation to make it sufficiently friable to lay it smooth for the scythe again.

The following is an estimate of the cost of cultivating an acre of corn two years, including cost of manure and interest on the value of the land. I fix the expense of labor high, as the estimate is based on the supposition that all parts of the work will be done in the best possible manner:—

First Year.

Interest on land at $60.00 per acre		$3.60
Ploughing twice		7.00
Eight loads of compost and putting in the hill		10.00
Planting and seed		3.00
Hoeing three times with cost of cultivating		7.50
Topping, harvesting, and threshing		9.00
Total cost of cultivation, &c.		$40.10

Produce.

65 bushels corn, 75 cents per bushel	$48.75
Fodder	6.00
Total value of crop	$54.75
Deduct cost of cultivation	$40.10
Profit per acre	$14.65

Second Year.

Interest on land, $60.00 per acre		$3.60
Ploughing once		2.50
Twenty loads long manure	$20.00	
Eight ditto compost	8.00	28.00
Carting manure		6.00
Planting and seed		3.00
Hoeing three times and cultivating		7.50
Cutting up stalks, harvesting, and threshing		10.00
		$60.60
Deduct one-half value of manure for future crops		14.00
Cost of cultivation and manure		$46.60

Produce.

Eighty-five bushels of corn, at 75 cents per bushel	$63.75
Fodder	7.00
Value of crop	$70.75
Deduct cost of cultivation	$46.60
Profit	$24.15

I need not add that land treated in this way will produce a good crop of wheat and oats the next year, and large crops of grass for several years following.

I subjoin a statement of the amount of corn per acre raised by several farmers in this town in 1846—7, as reported by a committee of the Agricultural and Mechanical Association, for three years, omitting names, together with the fractional parts of the bushel.

To wit: for

1846..............134—132—111—110—103—96—92 bushels.
1847..............122—120—110—103 ditto.

I regret the report of 1848 is not at hand, as I think the crop was equal to any former year. This year there has been a great falling off in consequence of a severe drouth. It should be understood that the above measurements were made during the time of harvesting, and that from one-eighth to one-sixth should be deducted for shrinkage in drying. The mode of cultivation was substantially the same as that above described, excepting that in some cases the compost was spread on the surface and harrowed in, instead of being put in the hill. I ought to say that some of the largest crops were obtained by ploughing but once—spreading a heavy dressing of compost on the surface, and mixing it very thoroughly with the soil by harrowing; whether this permanently improves the soil as much as harrowing in long manure, may be a question.

The varieties of corn, besides the Canada corn above described, are the Cass corn, an eight rowed variety, and the Dutton corn. The weight of all these varieties does not vary much from 60 lbs. per bushel.

Very respectfully,

AUSTIN RICE.

Hon. Thomas Ewbank,

Commissioner of Patents.

GREEN CORN FOR SOILING COWS.

Methuen, Mass., *Dec.* 1st, 1849.

Dear Sir:—As I have been informed, other individuals from the county of Essex, better qualified than myself, have answered your circular, and as I answered several questions myself last year on the same subjects, I shall now merely refer to subjects on which I have tried experiments.

To ascertain the value of green corn for milch cows when compared with hay, I tried the following experiment. About the middle of August I com-

menced feeding my milch cows with English hay in addition to the feed of the pasture, which was short in consequence of dry weather. I weighed the milk of four cows for three successive weeks. The first week they were fed on hay, the second week two were fed on hay, and two on green corn, the third week those that were previously fed on corn were fed on hay, and those that were previously fed on hay were fed on corn.

Some of the cows were more fond of hay than corn: others again preferred the corn. Having carefully observed the manner of their eating and the weight of their milk, I came to the conclusion, that they would produce about the same quantity of milk. The hay used was cut early and of superior quality. If the hay had only been of medium quality, I think the corn would have produced the most milk. As corn can be easily cultivated, and will produce abundantly, I know of nothing (every thing considered) so valuable for soiling cattle in the latter part of summer and autumn as green cornstalks.

Again, you ask for information in regard to the comparative value of raw and cooked meal for feeding.

In 1842 I tried the following experiment to ascertain its comparative value for feeding swine. August 25, I put up five pigs, weighing as follows:

Pig No. 1	106 pounds	fed on scalded meal.
" 2	81 "	"
" 3	73 "	"
" 4	110 "	raw meal.
" 5	99 "	"

Three were fed on scalded meal, and two on raw meal; each pig was fed with the same quantity of meal, and consumed in 59 days 229 pounds of corn meal, to which were added each day about three pints of skimmed milk, with as much water as was thought necessary.

October the 19th, they were again weighed, and the result was as follows:—

Pig No. 1 weighed	170 pounds,	gain	64 pounds.
" 2	148 "	"	67 "
" 3	134 "	"	61 "
" 4	180 "	"	70 "
" 5	167 "	"	68 "

Those fed on scalded meal gained in 56 days on an average 64 pounds each, those fed on raw meal gained 69 pounds each. I then changed their feed; those previously fed on scalded meal were now fed on raw meal, and scalded meal was given to those that had been kept on raw meal: and instead of feeding them three times a day, as I had previously done, I fed them but twice a day, giving them, however, the same quantity of food, 166 pounds in 40 days.

November 28th, they were again weighed, with the following results:—

Pig No. 1 weighed	209 pounds,	gain	39 pounds.
" 2	183 "	"	35 "
" 3	182 "	"	48 "
" 4	213 "	"	33 "
" 5	207 "	"	40 "

In this case, the three pigs fed on raw meal gained in 40 days on an average 40⅔ pounds each, and those fed on scalded meal gained on an average 36½ pounds each; the result being in both cases in favor of the raw meal.

That there should be no mistake in regard to the above experiment, I fed them nearly all the time and weighed them myself.

Yours respectfully,

JOSEPH HOW.

Hon. Thomas Ewbank,

Commissioner of Patents.

SHEEP HUSBANDRY, WOOL, &c.

"What the prevailing races—what the condition of this branch of industry—amount of wool clipped in the year, and average weight of fleece of different races—cost of keeping sheep through the year per head—where your markets—what your system of selling—have you wool depots, and are they found advantageous for wool grower and manufacturer—what number killed by dogs in your State." [*Circular.*

Mr. Geo. W. Drisko, Washington Co., Maine, writes thus: "There are a number of flocks of Merino and Saxony sheep in this county, which produce considerable quantities of wool; average weight of fleece 3 lbs., price 37½ cents. Estimated number in this county, 4000; probably seven per cent. are annually destroyed by dogs, wolves, and bears. Most of the wool is sold or exchanged for cloth at the woolen factories in the western part of the State, or disposed of to the agents of these manufactories throughout the eastern counties."

Mr. Isaac Hubbard, of Claremont, N. H., says: "We have very few full-blooded Merino and Saxony sheep; but they are mostly crosses of these with native breeds. This branch of husbandry rather flags in this section. Many of our farmers are discouraged, and are getting rid of their sheep as best they can, selling them for their pelts, or killing them for mutton. The cause of this is that cattle-breeding is found much more profitable than raising sheep. Hence farmers are selling off their flocks of sheep, and are going more extensively into the breeding of cattle for the Brighton Market. The cost of keeping sheep through the year is about one dollar per head; and from 2½ to 3 lbs. is the average clip. Several wool depots have lately gone into operation, and are spoken of very favorably, as equalizing the price according to the quality of the wool."

From Hydepark, Vt., Mr. Ariel Thurston writes as follows: "In this State there are many flocks of pure Merino and Saxony sheep; and increased attention has of late been paid to this branch of industry. Cost of keeping, about one dollar per head—average clip, native 3 lbs., Saxony 2½ lbs., Merino 3½ lbs. Quantity of wool clipped in this county estimated at from 27,000 to 30,000 lbs. There are no wool depots in this section, although several have been established in the State. Most of our wool is sold to manufacturers and their agents, in this and the adjoining States. But few sheep are killed by dogs, under the existing stringent laws on this subject."

Mr. Samuel Wells writes from Northampton, Mass.: "The number of sheep in this State has probably diminished for some years past. The introduction of Saxony sheep and crossing them with Merinos has increased the fineness of the wool, but has rendered the sheep more feeble and more subject to diseases, and has also diminished the average weight of the fleece. These facts, together with that of raising sheep at half the expense in the Western States, has caused a decline in this branch of industry."

Hon. J. D. Patterson, of Westfield, Chautauque county, N. Y., writes as follows: "The condition of this branch of husbandry is not as promising as it formerly was; the prices of wool for two years past having been too

low to afford the wool grower a fair remuneration. The land in this county is as well adapted to dairy purposes as to wool-growing; and as the former business is the most profitable, it has been largely increased, to the neglect of the wool-growing interest, which has probably decreased in the same ratio. The amount of wool clipped in this county during the past year is about 400,000 lbs.; and the average weight of fleece varies, in native breeds from 2½ to 3 lbs., Merinos from 3 to 4 lbs., Saxony from 1½ to 2½ lbs. The cost of keeping sheep through the year is from $1.00 to $1.25 per head, depending much upon the season. Our market for wool is in the villages and large towns, where it is mostly bought by manufacturers and speculators. But few sheep are killed by dogs—probably not over one per cent. I have a flock of about 550 pure blooded Spanish Merino sheep, which will average over 5 lbs. of wool each—worth at this time 40 cents per lb. I have also a pair of Merino sheep one year old, which were imported from France. The buck sheared the present year 14½ lbs., and the ewe 10 lbs. 10 oz., thoroughly washed wool, samples of which I send you enclosed."

Mr. J. L. Merreck writes from Delaware county, N. Y., as follows: "This branch of industry, once quite prosperous, has been greatly discouraged by the tariff of '46—which so much reduced the price of wool and cloths. The prevailing races here are the Merino, Saxony, and Southdown. The two first are raised for wool, the last named for mutton. Average clip per head, Saxony 2½ lbs., Merino, pure and mixed breeds, 3 lbs., Southdown 3 to 4 lbs. Cost of keeping, about $1.00 a year, per head."

Mr. Alexander Ruff, of Xenia, Ohio, says: "We have a few pure blood Merino and Saxony sheep; but the great mass are a cross of the fine wooled with the common sheep of the country. The clip is about 3 lbs.; and the price about 25 cents on an average. Our wool is principally sold to dry goods merchants, or exchanged for cloths; and I do not think we realize the cost of production. This branch of husbandry, when considered in its most favorable light, affords but a very small profit to the farmer."

Mr. Rufus Coats, of Allen county, Ohio, appears to take a different view of wool-growing in the Buckeye State from that expressed by Mr. Ruff. He says: "I consider this a profitable branch of business in the western part of Ohio; and so far as my knowledge extends, I think it is increasing in popularity. The common breeds are the Merino and Saxony. I prefer a cross of the two for improving the quality of the wool. Average clip, 3 lbs. Cost of keeping, $1.87 per head."

Mr. Charles F. Ingalls writes from Lee Centre, Ill., thus: "Sheep do well in this section, if pastured; or if they have upon the prairie a shepherd to keep off the wolves. Breeds not much improved, but most lots of wool will average from ¼ to ½ Merino. The business of wool-growing is improving; and we are much in want of factories to work up the raw material into cloths."

Mr. Origen Perkins, of Racine county, Wis., says of sheep husbandry in that State: "Many flocks have been brought here of fine Saxony and other breeds. They are healthy and thrive well, and sheep would be very profitable stock, but for the ravages annually made among them by dogs. Until very recently, most of our fine wool was sent East; but now our farmers find a home market, as several woolen factories have been put in operation in different parts of the State. Sheep can be kept on our prairies at a trifling expense in summer, and in winter they thrive well on prairie hay. This must eventually become an important branch of farming in this State."

Mr. Benj. Whitfield, of Tuscaloosa, Ala., writes thus: "In this branch of husbandry we lack every thing but climate and soil: and these are perhaps not surpassed by any section of the country in the same latitude. Nowhere is land cheaper, nowhere is there a drier climate, or one less exposed to sudden changes. Sheep can be wintered here for 25 cents per head. Any stimulus which can be given to wool-growing will be an important step towards the improvement of the country."

Mr. Pryor Lea, of Goliad, Texas, writes as follows: "We have at present but few good sheep in the country; they being principally of the Mexican breeds, which are very inferior. The cost of keeping is little more than herding, not over 25 cents per head. I think south-western Texas the best adapted to raising sheep and wool-growing of any part of the United States."

WOOL GROWING, WOOL DEPOTS, &c.

KINDERHOOK, NEW YORK, *January* 15, 1850.

SIR:—A circular from your office has recently been handed to me by Dr. J. P. Beekman, of this town, in which sundry questions are propounded on the subject of sheep husbandry, with the request from him that I should prepare some statements with reference to the subject; but more particularly in relation to the question, "Have you wool depots, and are they found advantageous for wool grower and manufacturer?"

1st. "*What the prevailing races.*"—Each of the different varieties of sheep grown in the United States may be found in the State of New York. Wool growers located in the vicinity of our large cities and towns, who have heretofore bred fine Saxony sheep, have to a great extent within the past five years changed their flocks for large-framed, coarse-woolled sheep, whose carcasses are valuable for mutton; and they derive a greater profit from the Leicester, Southdown, and Cotswold sheep, and their crosses with the native and other breeds, by the sale of mutton and wool, than from the sale of wool alone from the finer grades of Saxony and Merino. Yet the most enterprising wool growers in this State are breeding the Saxony and Merino sheep, and many are crossing the two varieties, which cross gives the grower a fleece weighing from three to three and a half pounds of wool. With the foregoing exceptions, Merinos and their grades are the prevailing races.

2d. "*What the average weight of fleece of different races.*"—The average weight of fleece of large flocks of the full blood Saxony breed is about 2¼ pounds; of the full blood Spanish Merino, 4 pounds; of the cross of Saxony and Merino, 3¼ pounds; of the grades of Merino and native cross, 3 pounds; and of the Leicester breed, about 5 pounds. J. A. Taintor, of Hartford, Conn., has recently imported a variety of Merinos from France, which are large, well-formed sheep, and from which flocks may be reared producing fleeces weighing 7 pounds of medium quality of wool washed on the back. I have seen one fleece, 16 months growth, which contained 14 pounds of wool, well washed before shearing. Messrs. Smith and Catlin, of Litchfield county, Conn., have, within the last year, imported a race of Saxony sheep, which, judging from the specimens I have seen, will yield larger fleeces of a superior quality of wool than most of the former importations introduced into this State, yielding 3 pounds per fleece in the ordinary mode of washing.

3d. "*What is the cost of keeping sheep through the year, per head?*"—Assuming the fact, which is verified by our most enterprising agriculturists, that the keeping of sheep upon grain-growing lands greatly increases the fertility of the soil, it may safely be estimated that 70 sheep may be kept upon 100 acres of cultivated grain land without diminishing the grain crops, but, on the contrary, increasing them. Various estimates have been made of the cost of keeping sheep in this state—much depending upon the price of hay, aside from its value for feeding on the farm for increasing manure, and the value of lands adapted to pasturage. From 2½ to 3 per cent. of the weight of sheep per day will be found sufficient through the foddering season.

4th. "*What is the condition of this branch of industry?*"—The condition of this branch of industry is not improving so rapidly in this State as in the Western and Middle States. Large numbers of sheep are annually driven from this State to supply the demand from the West. The high prices of butter and cheese for the past five years have led to substituting the dairy for sheep husbandry in many districts; and yet since 1840 there has been an increase in the production of wool. The clip in 1840 was, according to the statistics accompanying the census, 9,845,245 pounds—in 1845, 13,864,828 pounds. Estimating the last mentioned quantity at 35 cents per pound, and which is believed to be a fair one, it amounts to $4,742,689; and when there are added to this the sales of sheep and lambs for mutton, the annual value of this branch of agricultural industry assumes an importance worthy of attention. Every thing calculated to foster and sustain this interest in the hands of the farmer, should be carefully considered. It is of the utmost importance that he should be informed of every improvement that is being made, by which he shall be secured the full value of his wool. Hence it is not only necessary for him to investigate principles relating to the breeding of sheep, (in order that he may be successful in producing that kind which is most profitable,) but what is equally important for him, so to investigate the present system of the wool trade as to enable him to determine whether his success is not equally dependent upon a change in that system as upon improvements in his flock. I shall confine myself chiefly to the necessity for such change, and the remedy proposed by establishing wool depots: and only allude to such facts in breeding and keeping sheep as appear to be necessary to rightly understand this branch of the subject.

Much discussion has been had to show which was the most profitable, whether Saxony, a cross of Merino and Saxony, Merino, or large-framed, coarse-wooled sheep, whose carcasses are suitable for mutton. The success attendant upon the growth of each kind appears to have depended upon the skill and management of the grower, and the facilities enjoyed for the sale of the wool or carcass.

Those residing near cities or large villages, or possessing easy facilities for reaching these places, may find large-framed, coarse-wooled sheep, to a *limited* extent profitable; but such is not the fact in regard to the great mass of wool growers in the United States. The profits arising from their flocks must result from the wool, or from the sale of sheep made valuable, by the skill of the breeder, for their superior fleece.

Where the facilities for selling have been such that the intrinsic value of the fine fleece could be obtained, I think I am not hazarding too much by saying, that the profits arising from the growth of fine wool have been

greater than on the lower grades. But where these facilities for selling have not been enjoyed, the profits have been in favor of the grower of medium and low qualities. As a proof of this, reference may be had to the fine wool grower in those sections of the country where, by reason of their superior clips and large flocks, great inducements were held out to fine wool purchasers to visit them for the purpose of buying; and thus a competition was created, which resulted in fair prices; while in other sections, where equally as fine wool was produced, but in less quantities, or where the low, medium, and high grades were grown promiscuously, those producing the fine qualities have been under the necessity of selling their fine wool at 2, or 3, or at most 5 cents only, above the price paid for the common or low grades, and that too when the superior condition of the fine fleece alone, independent of its quality, would make that difference: thus sustaining a loss of all their skill, care, and expense, in breeding fine instead of common or medium wools.

5th. "*Where are your markets?*"—Until the commencement of the year 1845, no general system for the selling of wool had been adopted in this country. Some wool growers carried their clips directly to the door of the manufacturers, and accepted the price which was there offered; others awaited the arrival of the manufacturer, or his agent, to negotiate sales at their own doors; some depended on the country merchant as a purchaser, who bought to sell again; others upon the wool dealer or speculator, who would buy if the margin in the price promised a good profit; some forwarded their wool to the large cities to be sold at commission houses. The wool thus found its way to the loft of the manufacturer through a variety of channels, with one or more intervening profits after leaving the hands of the grower.

At the meeting of the N. Y. State Agricultural Society, held at Poughkeepsie in the fall of 1844, the inequality of prices obtained by the diversified modes of selling wool induced Dr. John P. Beekman, then president of the Society, and other leading agriculturists of the State, being themselves extensive wool growers, to devise the plan of selling their clips through the medium of a wool depot.

One of the prominent causes of the success of the European manufacturers of woolen fabrics may be found in their ready access to wool dealers and staplers, where a nice discrimination is made in classifying the various styles and qualities of wool, which enables them to select that which is exactly suitable for the goods they wish to produce.

The principles involved in this system are not new, it being conducted upon those of a commission business; but it is only the details and application of these principles to wool, when received direct from the grower, that had never before in this country been applied in the same discriminating manner, and with as little expense as by this system.

By the classification and arrangement of the fleeces, facilities are given to the manufacturer to purchase, in an intelligent manner, the style and quality best adapted to his goods, while at the same time the grower's interest is protected by the different grades being offered for sale to such, and such only, as required them.

Upon the delivery of the wool at the depot, each lot is weighed, and a receipt given to the owner for the amount. The fleeces are then carefully examined and classed according to their quality; each class or sort is weighed, and a record made of the weight. It is then examined with refer-

ence to its condition. If any portion of the clip is found to be unwashed, or partially washed, or to contain filth, tags, or other substance inside of the fleece, except well-washed wool, a discount is made upon the weight of such fleeces, a record is made of this discount, and it is charged to the owner, and allowed to the manufacturer or purchaser. The fleeces, when thus classed, compose a sort of equal value in quality and condition. When there is any thing in the style or condition of the wool which renders it of more than ordinary value, or if the owner wishes, it is kept separate from the other clips, after being sorted. The various sorts are known by the following designations: Super, Extra, Prime, No. 1, No. 2, No. 3, De Laine No. 3, No. 4, De Laine No. 4, No. 5, and long combing.

There are few flocks, however carefully bred, which will not embrace three or four of the above-mentioned classes—many six or even eight of them. Hence the wool grower under the old system, when disposing of his wool to a manufacturer using the lower grades, must expect that such a price only will be offered for his whole clip as the lower grades are worth; and the fine wool manufacturer will not become a purchaser unless a large proportion of the clip is of a quality suited to his purpose. It will readily be seen that these difficulties may be obviated by a judicious classification of the fleeces. The following statement will show the usual relative value of the different sorts, and the uses, in part, to which they are applied. The prices here mentioned for the finer qualities are taken from the highest range of the present year. For the lower qualities there has been an unusual demand, and prices have ranged higher. No. 5, which is the coarsest grade, and used for making coarse satinets, baises, and the coarser kinds of heavy goods, 25 cents; No. 4, used for low flannels, satinets, and ¾ cloths, 28 cents; No. 4 De Laine, used for a medium kind of worsted goods, 29 cents; No. 3, used for flannels, medium cassimeres and satinets, and low-priced broadcloths, 31 cents; No. 3 De Laine, used for mousselin De Laines, and other combing purposes, 32 cents; No. 2, adapted to fine fancy cassimeres and medium broadcloths, 35 cents; No. 1, used for similar purposes, 39 cents; Prime, 44 cents; Extra, 50 cents; Super, 60 cents; another quality may be selected from the Super, called Super-super, worth 75 cents. These high grades are used for the finer qualities of cassimeres and broadcloths. The difference between Nos. 3 and 4, and the De Laines or combing qualities of the same Nos., consists in length and strength of staples, and not in the fineness of the fibre. As a further illustration of the relative value of wool, we may take the standard applied in 1846 and '47 by some of the large manufacturers of fine wool to their sorts, after the fleeces have been parted on the stapler's bench. Two examples will be given, with the name and price of each sort: Super, 80 cents; Extra, 65 cents; Prime, 52 cents; No. 1, 44 cents; No. 2, 38 cents; No. 3, 33 cents; No. 4, 28 cents; No. 5, 25 cents; Listing, 20 to 22 cents.—Extra, 90 cents; Picklock, 75 cents; No. 1, 63 cents; No. 2, 53 cents; No. 3, 45 cents; No. 4, 38 cents; No. 5, 32 cents; No. 6, 27 cents; No. 7, 23; and Listing, 20 cents. I have invariably found it the case that the fine wool manufacturer attaches a much higher value to the fine qualities in his sorts, than a manufacturer of medium wool would to the same quality of wool; also, that the manufacturer of low and medium qualities attaches a higher value to the low qualities, than the fine wool manufacturer does to wool of the same grade. Few if any of the manufacturers of low or medium goods reach a point in the stapler's scale above 50 cents. They

usually make a less number of sorts, and estimate about 5 cents difference between each.

It needs no argument to show that the manufacturer of fine broadcloths, cassimeres, satinets, flannels, or worsted goods, can at a depot select such wools as are exactly suited to his peculiar style of goods, without being under the necessity of purchasing a single fleece he does not want; and that with such facilities, it is for his interest to pay a fair market price, according to the relative value of the style or quality he wishes to work; and furthermore, that he is not paying for filth concealed in the inside of the fleece, instead of wool.

It is for the interest of the wool grower, as well as the manufacturer, that they should be brought together with the least possible expense, and in a manner that the improvements or frauds of the one should not escape the notice of the other. I have the opinion of several manufacturers, who certainly ought to be competent judges of the fact, that full five cents per pound intervenes when the wool finds its way from the grower to them through the ordinary channels of trade; whereas, under the depot system, one and a half cents per pound will cover all expenses for receiving, insuring, sorting, storing, and selling.

Those who have been the friends and supporters of this enterprise, by annually depositing their clips, find that it affords an excellent opportunity of having it examined by a competent judge, and its merits or defects pointed out; and by comparing it side by side with other clips, to learn the true character and value of their wool. Again: the depot forms a kind of *exchange*, at which place during the season for depositing wool the growers may meet and compare views, communicate and receive information concerning the improvements each has made, and from the books of the agent determine, from the sorting of the different clips, and the prices obtained for each, which is most profitable; and also where those flocks which produce the style of wool they wish to grow, are to be found. Other duties may prevent the farmer from bestowing as much time as is necessary to procure that information which is essential to become a successful grower of wool. It very naturally falls within the range of the duties of the agent of a depot to collect just that kind of information most needed, and from his records it is easily conveyed to the wool grower.

It may readily be seen, from what has been said, that in order to insure the successful prosecution of the depot system, large quantities of wool must be deposited in one place; for unless this be the case, a sufficient quantity of each sort cannot be obtained to make it worth the attention of a manufacturer to visit a depot and make his own purchases.

The question naturally arises,—Will the manufacturer approve of this system in making his purchases? Knowing them to be a shrewd, cautious, and enterprising class of business men, before deciding upon the feasibility of the depot system, I visited many of the most prominent manufacturing establishments, and after presenting the object I had in view, received from them assurances that it met with their cordial approbation. I also received from them much valuable information in regard to the relative value of their sorts, the adaptation of the various styles and qualities of wool to the different kinds of goods manufactured, which it would have been difficult to procure from any other source.

It is now five years since the first wool depot was established in this country. The approbation of manufacturers has been manifested by their purchasing all the wools deposited with me at their full market value. An annual increase of the quantity received, in the ratio of fifty per cent. per annum, justifies the conclusion that it meets with the entire approbation of the enterprising wool growers.

The position is assumed by some, and with a degree of plausibility, that were a large portion of the wool growers to turn their attention to the growth of fine wool, the market would be overstocked, and consequently prices decline; but we live in an age of improvement—our manufacturing and agricultural interests are not behind the spirit of the age. The woolen manufacturers of this country, by reason of their enterprise, skill, and long experience, and the improvements in machinery, are rapidly progressing towards that state of perfection in their goods which will enable them to compete successfully with the foreign manufacturer. This will lead to a continually increasing demand for such qualities of wool as are adapted to the making of fine cloths and other superior fabrics. The process of raising the standard of the character of a low grade flock, is slow and tedious: and I have no doubt that after a quarter of a century spent in trying the various improvements suggested within that time, we are only approximating towards that high degree of excellence in our flocks as a *whole*, which is to be found in some of the choice flocks of Europe. Yet our improvements have been so great as to justify the assertion that as fine wools can be grown in the United States as in any other part of the world.

The supply of wool grown in this country is far below the demand for home consumption. About eighteen millions of pounds of wool were imported in 1849, to supply this deficiency. A large additional quantity will soon be wanted to manufacture such fabrics as are now wholly supplied by foreign manufacturers, and which the ingenuity and enterprise of our citizens will soon produce. Within the last ten years from three to five millions of pounds per annum have been used in the fabrication of two descriptions of goods, which were previously imported from Europe. With a soil, climate, and herbage as well adapted to the growing of wool as any other part of the world, no good reason can be adduced why the skill and capital of our enterprising agriculturists should not meet with a reward as great as that which has crowned the efforts of the cotton planter; and taking into consideration our great extent of territory, the day is not far distant when the value of wool exported from this country will approximate somewhat that of cotton, though it may never equal it.

"*The effect produced on wool by keeping of sheep.*"—The condition of the animal should be uniform from the time of one shearing until the next. If this is not the case, the effect upon the wool will be injurious; for while the sheep is *fattening*, the wool will be of a grosser growth, and the fibre larger; and when it has become *poor*, the growth will be less vigorous, and the fibre smaller; and you have this result (which will readily be discovered by a practical eye in examining a fleece)—two qualities of wool in the same fibre. I have seen flocks which were well kept for six months after shearing, and then run down in flesh and remained poor until the next shearing, where the outer end of the staple was one full quality in fineness below the inner end; also when the animal had been well kept at the beginning and end of the year, but poorly kept and run down in the winter, the middle of the fibre showed the same difference.

This not only reduces the quality of the wool in the stapler's scale to the lowest and coarsest grade in the fibre, but also makes the fibre weak and ten-

der in the fine part grown when the animal was poor. The result of bad keeping, also, often injures the health of the sheep, which, in addition to the evils spoken of, gives the wool a knotty appearance and a tightness of the fleece. When the condition of the sheep is good, and they continue vigorous and healthy during the whole year, the fibre of the fleece will be free and uniform in quality, and the fleece heavier and more valuable, than when they are alternately changing from a high to a low state of flesh. *The fineness of the fibre should be produced by the high blood of the sheep, and not by poor keeping.*

"*On washing and shearing.*"—Before turning out to pasture in the spring, the sheep should be well tagged, care being taken to remove all the locks of wool that would be likely to retain filth. Very early washing often proves injurious; and especially is this true in regard to fine-wooled sheep. It should be delayed until the warm weather has fully commenced, which is usually not until June, when the water becomes sufficiently warm to facilitate the removal of the filth from the wool. Too early washing and shearing often expose the sheep to cold storms and the chilly effects of cold nights, without the necessary covering provided by nature for them; while too late shearing exposes them to the rays of the hot burning sun before the new growth of wool has attained a sufficient length to shield them from its effects.

The manner of washing sheep must necessarily vary, for all have not equal facilities. Pools of stagnant water should be avoided. Better not wash at all than have your flocks poorly washed; for if not washed, you arrive at the value of the fleece, compared with clean wool, by a well known and established rule of discount. The best mode is to use a running stream, or vat with a stream of water, having a fall of a few feet, running into it.

Just previous to washing, the sheep should be thoroughly wet without squeezing the wool, and suffered to stand crowded together for a few hours, until the soapy substance and oil or gum which the wool contains, unite; when again taken into the water and the wool squeezed with the hands, the whole of the filth readily separates from the wool, and passes off with the running stream. In the common mode of washing, the soapy substance first passes out of the wool, only partially uniting with the oil and gum, after which it is impossible to remove the gum, no matter how much time may be spent in washing. Care should be taken to wash the fleece thoroughly in all its parts. I have seen frauds attempted to be perpetrated by washing the back and sides, and leaving the belly and skirts unwashed, which in rolling up the fleece were carefully concealed. After washing, the sheep should be suffered to run in a clean green-sward pasture a sufficient length of time for the wool to get dry, which is usually in four or five days, and then shearing should commence. Very large flocks should be divided, and the washing done at different times, or they will run too long before being shorn. The place assigned to the flock when collected for shearing should be well littered with straw and kept clean, so as to prevent the filth, consequent upon their being close together, from getting upon the wool. In shearing, great care should be taken to keep the fleece whole. Each clip of the shears should sever a part of the wool from the sheep, and a second clip either on that part of the animal, or on the part of the fleece just severed, should be avoided; for clippings thus made are useless, and a total loss.

After shearing, the fleece should be removed to a table, or clean smooth place on the floor, with the inner part down; then gathered up into as compact a condition as it occupied when on the sheep; the sides of the fleece should be then folded over so as to meet on the back of the fleece, the head and neck thrown back so as to make the fold upon the shoulder; next be folded or rolled from the butt of the fleece, and continued until you reach the shoulder. The fleece should then be snugly tied with a small, smooth twine, passing around two, or at most three times. You thus have a compact fleece, easy to open, and the shoulder, which is the finest part, on the outside. Buyers always expect to see the *best side out*, and wool growers sometimes do themselves injustice by not thus exhibiting their fleeces. I do not believe that the manufacturers, as a whole, in this country, are yet prepared to pay a sufficient advance beyond the present prices, to justify the growers of wool in removing all of the fribs, belly locks, and skirts from the fleece, as is done with the fine wools of Germany. I would therefore at present put inside of the fleece all the well-washed and clean wool shorn from the sheep; carefully excluding all such locks as are filthy, or below the residue of the fleece in condition.

For fear of extending this communication to too great a length, I would refer your readers to the prize essay on this subject, written by the Hon. Daniel S. Curtis, and published in the transactions of the New York State Agricultural Society for 1848, pages 245, etc. This essay contains many valuable hints on the subject of sheep husbandry.

Respectfully, yours,

H. BLANCHARD.

Hon. Thomas Ewbank,

Commissioner of Patents.

SHEEP, WOOL, AND WOOL DEPOTS.

Buffalo, N. Y., *December 3d*, 1849.

Sir: I received from you some months since a circular, requesting information upon various subjects connected with agriculture; one branch of which, sheep husbandry, I have selected for an answer. I will reply to each question under this head separately, making my answers somewhat more general than your circular proposed. Having established a wool depot at this point three years ago, I have been enabled to become pretty thoroughly acquainted with the condition of sheep husbandry in the Western, as well as this and the Eastern States. First:

"*What are the prevailing races?*"—It is impossible to define the races of sheep in the Union by any distinctive names. In particular sections, sheep of pure Saxony and Merino breeds may be found, as also of the South-down and Cotswold. Generally, however, the great mass of sheep are grades between the Saxony and Merino, and the common coarse-wooled sheep of the country. Very little wool is brought to market now, except from Canada, that does not show, to a greater or less extent, the effects of a cross with fine-wooled sheep. There has not been sufficient encouragement given by manufacturers to induce farmers to grow very fine wool, and it will be a long time before our flocks will generally produce fine wool, or fleeces of uniform fineness.

"*The condition of this branch of industry.*"—The condition of this branch of farming is prosperous. Wool has not, it is true, brought as good

prices for the last two years as it has years before; and owing to peculiar circumstances, not so good in proportion as other farm products. But the depression will only be temporary: for already has the price of grain and of the products of the dairy fallen to that point that renders wool-growing now, and will for years to come, the most profitable as well as the most reliable branch of farming. The uncertainty of the wheat crop in many of the Western States will drive the farmers to wool-growing much sooner than they would otherwise engage in it. And they will find that money can be made very easily, and with a certainty they have never known in grain culture. The transportation of bulky articles like grain, which are of little value compared with their cost of carriage, will always commend wool-growing to the farmer who lives at a distance from market. The cost of transporting a bushel of wheat from the Ohio or Mississippi river to this market would average 12 cents under the most favorable circumstances, and would sell on an average for about 70 cents; while the cost of transporting a pound of wool from any point west to this depot would not exceed three-fourths of a cent, and will bring on the average 25 cents.

The facilities for raising sheep are so great, and the advantages so apparent, that at no distant day, the amount of wool grown in the Western States will form no inconsiderable item in the agricultural resources of the people. When circumstances are favorable to the rapid increase of sheep, as the high price of wool, and low price of grain and dairy products, they increase at the rate of about 25 per cent. in four years.

"*Number of sheep, and amount of wool clipped this year.*"—The best data on this subject are furnished by the last census of the United States, and of the State of New York made five years after. The whole number of sheep in the United States, as shown by the census of 1840, was 19,311,374; and the amount of wool shorn was 35,802,114 lbs. Of the sheep, about one-fourth were under the age of one year; leaving, therefore, about 14,500,000 as the number shorn. This would give 2½ lbs. as the average weight of fleece; which is below the average in this State, as shown by the census of 1845. The average here was 3 lbs.

The increase of sheep in this state, from 1840 to 1845, was as follows:

1845	6,443,855
1840	5,118,777
Increase in 5 years	1,325,078

a fraction over 25 per cent.

Increase of wool during the same time was:

1845	13,864,828
1840	9,845,295
Increase in 5 years	4,019,533 lbs.

This shows that the increase of wool was equal to the general average per head in this State, of three pounds.

Allowing for the same ratio of increase as is shown in this State, the whole number of sheep in the Union in 1845 would be almost twenty-four millions. Of these, eighteen millions would be over one year old, so that the clip that year was, at 2½ pounds per head, about fifty millions of pounds. The whole number of sheep in the Union in 1850 will not vary much from thirty millions, which, upon the above data, will give about seventy million

pounds of wool for the clip of that year, or a trifle over three pounds for each inhabitant of the United States.

"*Average weight of fleece of different races.*"—It is next to impossible to give any satisfactory answer to this branch, as so much depends upon the method of washing, the time of shearing, and the accuracy of weighing. Sheep of Merino blood, or when that blood preponderates, will shear upon an average 3½ lbs. wool washed upon the sheep, and shorn as soon as dry: while the Saxony and crosses of that breed will shear but about 2¼ lbs. of wool equally well washed. There is, however, a very perceptible difference in the locality of keeping the sheep, as to the weight of fleece. The fleece of the same sheep driven from this State or the Eastern States to the West, and kept equally well or even better, will not weigh as much by an average of one-fourth of a pound. Though the wool is by that much better to the manufacturer, for the loss is in the animal oil, and gum, which has been cleaner taken out of the wool by the alkaline nature of the fine dust of the prairies that was mingled with it before washing.

The weight of medium grade fleeces will not vary much either way, and for all practical purposes it will be safe to assume three pounds as the average weight of fleece throughout the Union.

"*Cost of keeping sheep through the year.*"—This question can only be answered with reference to each particular locality, and even then it depends upon a variety of circumstances; such as being near to, or remote from, a good hay market—having a good or bad year for grass, &c.

As a general rule, land that will ordinarily yield one ton of hay or 40 bushels of corn per acre, will support one hundred sheep to every thirty acres, summer and winter. Twenty acres will graze them, and ten acres will yield the hay and grain required. With that data it is easy to perceive that the cost of raising sheep and growing wool must vary immensely. Thus, upon the prairies of the West and South-west, where land is worth $1.25 per acre, the cost is a mere trifle; while in New York and New England, where land ranges from $25 to $60 per acre, it will, of course, cost much more. And yet there is scarcely a farm in the country where sheep cannot be profitably kept. Lands are generally valuable because of their proximity to markets; and while the carcass of the sheep is worth comparatively little in remote districts, yet near the large towns, and among a dense population, the mutton is worth as much as the wool—making it thus a profitable animal to raise even upon high-priced lands.

"*Where are your markets?*"—Our markets are purely domestic, as no wool is exported, nor can there be for a long time to come. The demand far exceeds the supply; and we import annually from 12 to 20 million lbs. of wool, besides nearly or quite as much more in a manufactured state. If our fine wools were as well washed and prepared for market as are the German wools, and as well assorted, in many seasons we might export wool to England; and much of the finer and medium grades grown upon the prairies would, if properly assorted, pay to export.

Of the wool consumed by manufacturers in ordinary years—that is, when there is a fair demand for fabrics—upwards of 28 millions of pounds are manufactured in New England, about 12 millions in New York, and about 10 millions in the other States, making about 50 millions of pounds the total annual consumption, aside from that manufactured by the producer at home. The machinery, however, now in operation is capable, in prosperous years, and when it is an object, of manufacturing upwards of 70,000,000 lbs.

"*The system of selling.*"—The common practice is for farmers to sell their clip at their own doors, to the agents of manufacturers or wool dealers in the large cities.

"*Are there any wool depots—and are they found advantageous to wool grower and manufacturer?*"—There is but one wool depot west of the Hudson river, and that is the one in this city, originated and carried on by myself; and every year's experience convinces me more and more that the system, if properly conducted, is the only one whereby the farmer can get the full market value of his wool, or the manufacturer obtain his supplies at a reasonable rate. The benefits and advantages are briefly stated in the following extract from a letter written by myself to a friend, and published in that very excellent work, "Sheep Husbandry in the South," published by J. S. Skinner, Philadelphia:

"I will give you, first, an account of the object; second, the method of doing business; and third, the advantages of the wool depot system.

"*The object.*—Upon no sheep is the wool exactly alike over the whole body; nor is the wool exactly alike upon any single flock. In most flocks there is a great diversity—greater than there should be for the farmer's profit. There is, then, a variety of grades of wool in every flock, and in every section of the country where wool is grown.

"Manufacturers first grade the wool; that is, sort the fleeces, making from five to eight or nine different grades. Each fleece is then opened and stapled, or sorted into the various grades in the factory. Some manufactories use only the finest, others only the coarsest, and others again use only one kind of the intermediate sorts, so that from a single flock I sold this year wool to five different manufacturers, no one wanting or working the kind the others wanted. Now the object of the wool depot is to sort and arrange the wool, that the manufacturer may readily obtain the particular kind adapted to his machinery, and to obtain for each sort its fair value.

"*Method of doing business.*—I have a competent and experienced sorter, and when wool is sent in it is at once sorted in the fleece, each sort weighed and entered in a book under the name of the person sending it. After the wool has been properly sorted, it is piled up in a manner that will enable the purchaser to see it to good advantage; insured, and held until the market requires it. I make all my sales here, and for cash. When the sales are closed, an account is made out and sent to those who have sent me their wool; usually an account is rendered as fast as any part of a man's wool is sold. I have often been asked how I could tell whether any man's wool is sold, unless the whole sort was sold at a time. It is very easy. Suppose A has 100 lbs. of No. 1, and I have sold 20,000 lbs. out of 40,000 lbs.—that being the whole amount in the depot—I have sold one half of each man's No. 1, and I turn to A's account and give him credit for 50 lbs. sold, and so go through, and credit each man with his proportion of the quantity sold.

"The charges for receiving, sorting, and selling, are one cent per lb. and the insurance—which is usually about 30 cents on $100, for three months. Cartage from the docks is about three cents per bale. The sacks are returned, or sold, at the option of the owner. They are usually worth about fifty cents, more or less, according to their condition. Each man's wool is carefully examined; if put up in bad order, it is so noted, and a deduction made by the sorter, to make it as it should be—so that it is no object for a man to send to the depot wool in a bad condition.

"*The advantages.*—The foregoing facts would seem to be so plain, that it cannot be necessary to refer to the advantages. No man, however, is more at the mercy of the speculator than the wool grower. The very fact that he has so many kinds of wool in his clip prevents him from ascertaining the market value of the whole: for being in comparatively small quantities, he has not enough of each, if ever so well sorted, to make it an object for the different manufacturers to visit him. He is therefore compelled to sell his whole clip at the price of his present quality, and at prices from five to fifteen cents per pound under the real market value of his wool.

"When the manufacturer can get the kind of wool he wants, and in large quantities, he is willing to pay, and does pay a better price, than when he has to buy that which he does not want, to get the right sort. It also equalizes the market, and brings the producer and manufacturer together without being compelled to pay agents or speculators, and prevents that fluctuation of the market which is always produced by speculation.

"But there is another great advantage growing out of this system. It enables the wool growers in various sections of the country to compare wool, and to know who has really the best and most profitable kind of sheep. It has been strikingly manifest to me this season: for I have been enabled to point out to people in different States west, where they could find the most profitable sheep, by the wool which had been sent me. And in one instance, men had been five hundred miles after sheep, and paid high prices, when there were sheep in their own town worth double the money.

"Nothing is more certain, than that a wool depot, to be successful, must be so located as to command a large amount of wool. The larger the amount you can concentrate at one point, the more rapid and sure will be your sales."

"*The number killed by dogs.*"—The laws are so stringent on the subject in the State of New York, that few sheep are annually lost from being killed by dogs. But in some States, particularly in Ohio, the destruction of sheep from being killed by dogs is a very serious evil, and prevents the increase of sheep to an important extent. It costs annually nearly or quite as much to keep a common-sized dog as it would to keep five good sheep. I apprehend, however, there is no comparison of the profits made upon the sheep and the dog. That community, which keeps dogs to the exclusion of sheep, is truly to be pitied; and it is to be hoped, that as the great value of sheep becomes more generally known, these communities will become very rare.

With much respect, I am very truly yours,

T. C. PETERS.

Hon. Thomas Ewbank,

Commissioner of Patents.

SHEEP HUSBANDRY.—WOOL DEPOTS.

WASHINGTON, PENN'A., *Nov. 20th*, 1849.

SIR:—Your circular of July, 1849, came duly to hand, and I have concluded to answer, as far as is in my power, your inquiries in relation to "Sheep Husbandry," being more acquainted with this than any other subject upon which you have solicited information.

"*The prevailing race of sheep*" in western Pennsylvania is the Merino. In some regions the native sheep are still cultivated in small flocks. In eastern Pennsylvania the Bakewell, Cotswold, and other races are raised to some extent, but not in large flocks. Wool is the staple of this county, and is perhaps more extensively grown than in any other county in the Union. Here most of the flocks are crossed with the Saxon, and many of them possess the characteristics of that race. The business of wool-growing has attained a high degree of improvement, but still there is room for *progress* in this highly interesting branch of American industry.

"*The condition of this branch of industry*" with those who have their wool thoroughly cleansed is quite discouraging. Those who have their wool but partially cleansed have sold at about the same price obtained by those who have their wool *clean* and *light*. They of course have less reason to complain of prices. This is owing to the unrighteous system of buying wool, which is usually done by injudicious speculators and agents, who traverse the country from house to house, and most of them are unqualified, and too careless if they were, to discriminate either as to quality or condition.

The amount of wool clipped in this county annually is over a million of pounds.

"*The average weight of fleece of the different races*" of sheep depends very much upon the size and condition of the sheep, and also upon the compactness of fleece, length of staple, and condition of the wool. Hence, when I read of very extraordinary heavy fleeces, I conclude the flock is small, the sheep large and in high condition, the fleeces compact, staple long, and wool *not very clean*. So that the character of the flock, as regards texture of wool and weight of fleece, depends very much upon the care, judgment, and taste of the grower. Fleeces of Saxony sheep are generally light; one reason of which is, more attention has been paid to fineness of fleece than other requisites which constitute the *perfect* animal. As a general rule, however, medium and low grades produce much heavier fleeces than very fine sheep. Many flocks in this country, when the owners have pride and honesty sufficient to induce them to have their wool in a high state of preparation for market, do not average more than two pounds in the fleece. And if all the wool of the country were thoroughly cleansed, the average would not exceed that very much.

"*Cost of keeping sheep through the year per head*,"—about one dollar. This, however, depends in a great degree upon the size of the sheep. For like other animals, they require an amount of nutriment proportioned to their size.

Philadelphia was formerly our principal market; but recently most of our wool has been sent directly to New York and New England.

Our "*system of selling*," as above stated, is to speculators and agents who traverse the country during the season, frequently calling at the same

house several times, buying up the wool without judgment or discrimination, either as to quality or condition.

We have no "*wool depots*," but I have no hesitation in saying that when adopted they will be found mutually beneficial for wool growers and manufacturers. To secure their establishment, it needs only that they should be understood. The failure of the depot at Springfield, Massachusetts, may operate temporarily against this system, but it should not. That failed because it was not founded upon the right basis, nor in the right location, and was imprudently conducted. Wool depots should be established by regularly organized companies of wool growers, in the region where the wool is grown.

We had it in contemplation last summer to establish a wool depot here. A meeting was held, and a committee, of which I was a member, was appointed for the purpose of establishing one. The committee prepared a constitution, but, after consultation, deemed it too late in the season for definite action. At first, the only difficulty presenting itself was the procuring of necessary funds for making partial advances on wool which might be deposited by those needing such advances. This difficulty was, however, subsequently supposed to be obviated by a proposition from an experienced Eastern financier for creating a permanent loan of $500,000, which appeared entirely practicable. A constitution was drafted, which contemplated a joint-stock company of wool growers, who, when organized, were to elect a board of directors to manage the concern. The directors were to procure an experienced wool-sorter to grade or class the wool.

This grader was to be sworn, as flour inspectors and other agents are, to discharge the duties of his station faithfully and impartially. The directors were also to borrow the necessary funds, and be responsible for reimbursement, and to hold the wool deposited in the depot as indemnity for their liability; and the depot and wool deposited were to be insured, so that there could be no risk either on the part of borrowers, lenders, or depositors of wool. It was also made the duty of the directors to appoint a corresponding secretary to correspond with various parts of the world, for the purpose of ascertaining the state of the wool-trade, and report to the directors, from time to time, the result of his inquiries.

Thus the directors would be enabled to fix their prices intelligently on the various grades of wool in the depot.

The benefits which would result from the depot system, both to wool growers and manufacturers, are numerous, some of which I may be permitted to notice. First, I remark that the wool embraces such a variety, both as to quality and condition, which renders it impossible for common observers to make a proper discrimination, so as to enable them to judge its real value. This could be done by an experienced grader, who could enable each individual depositing to receive an equitable price, according to its real worth. By a just discrimination, this grader would make it the *interest* of all to have their wool thoroughly cleansed, a consummation greatly to be desired by manufacturers. This season the wool of this county will cost the manufacturers $60,000 more than the wool growers obtain for it. By the depot system, three-fourths of this enormous sum, say $45,000, could be saved, to be divided between growers and manufacturers. By the depot system, the immense amount of time consumed by speculators and agents, would all be saved; and more than that, the wool growers would be relieved from the vexatious stories about the dreadfully depressed condition of

the wool market. By the depot system, the wool will all be completely cleansed and judiciously graded, and the manufacturer will have no difficulty in choosing the kind of wool he wants, which being *clean*, he will have no difficulty in determining its value.

These and many other beneficial results are to flow from the depot system, and I confidently hope that the period is not remote when this system for disposing of wool will be adopted.

I should have been pleased to give you a more definite account of the *amount* of wool grown in this State, but not having the statistics, it is out of my power.

Yours, very respectfully,

SAMUEL McFARLAND.

Hon. Thos. Ewbank,

Commissioner of Patents.

ROOT CROPS.

"Irish and sweet potato, turnips, carrots, beets, mangold wurtzel, artichoke, and other varieties—comparative value—cost of production—weight per bushel—and the average per acre, and aggregate product for your State." [*Circular.*

The communications here given, in reply to the above, do not contain as full information on this subject as we could wish to lay before our readers; but they will show, in some measure, the extent of root culture, and the success or failure of the potato crop in different parts of the country.

In Maine, as appears from the report of George W. Drisko, of Washington Co., there is an increase of 33 per cent. over the crop of 1848. Many fields entirely escaped the rot; while others were more or less affected. "Our farmers," says he, "seem a good deal encouraged, and will probably, next year, plant after the old style, and to as great an extent as before the disease appeared. Planting and digging early have been found the only effectual preventive against the disease in years past. The average produce of potatoes per acre for the last two years will not exceed 175 bushels; price from 50 to 75 cents. Little attention is paid to the culture of other root crops, except in the garden for family use. Turnips have been grown to some extent, and are highly valued as food for sheep and cows."

In New Hampshire, different correspondents seem to agree in reporting the ravages of the potato disease as gradually decreasing. Mr. Marsh, of Sullivan Co., says: "The crop this year has suffered somewhat, but the disease has been more local, and would seem to justify the hope that it will eventually disappear. I have cultivated this vegetable extensively for the last three years, and have succeeded in growing healthy crops. I think we may safely depend upon a profitable crop by making use of dry swamp muck, together with potash, soda, lime, magnesia, and sulphuric acid; as these are the inorganic elements required by the plant to form healthy tubers."—Mr. Huntoon, of Unity, says: "On old pasture land, without manure, they are found not to rot. The average produce on such land is about 100 bushels per acre; number of bushels annually raised in the State before the rot commenced, about 7,000,000. Since that time it has not exceeded 4,000,000."—Mr. S. Hale writes us from Keene: "The only root crops raised here for other than family use, are potatoes, carrots, turnips, and beets—the last two by a few farmers only. Many years ago, it is said, that 600 bushels of potatoes were raised from one acre in this town; but now the average yield varies from 100 to 300 bushels. I think them a very exhausting crop. Of carrots the quantity raised in this county is constantly increasing; the product being from 500 to 900 bushels per acre. I raised this year, 85 bushels from one-eighth of an acre. A neighbor of mine raised 225 bushels from one-fourth of an acre; value from 20 to 30 cents per bushel."

Mr. Samuel Wells writes from Northampton, Mass., as follows: "The produce of potatoes has been very large this year, and mostly free from rot. In this section they are extensively grown as a field and garden crop, and fed in large quantities to stock during the winter. Turnips are raised to some extent for sheep, and beets and carrots for cattle and horses. Roots

are getting more into use for feeding to stock, and many barn cellars are now being constructed for storing them. Average yield of potatoes, 200 bushels; turnips, 500 bushels; beets 500, and carrots 300 bushels per acre."

From Hydepark, Vermont, Mr. Thurston writes, that potatoes have not rotted the present year. He says: "They can be raised here for 12½ cents per bushel, and sell readily in our factory villages for 20 cents. Swede turnips are raised to some extent as food for stock."

Mr. John G. Clarke, of South Kingston, R. I., gives us the following information on this subject: "Potatoes have been, until lately, largely cultivated in this section, but the rot has prevailed so extensively that this year not more than one-fourth as many acres were planted as were five or six years ago. The disease has been most destructive near the sea, and the shores of Narragansett bay, where the greatest quantity was formerly raised. Many farmers there raised from two to three thousand bushels. The kinds mostly cultivated are the Mercer or Chenange, White and long Red. The Mercer is much esteemed, and sells at a higher price than any other kind. Two hundred bushels per acre is about the average crop. Carrots are largely cultivated. The method practised by those who grow them extensively, is to plant carrots and onions in alternate rows, the onions ripening and being removed before the carrots require much space. It is said that as many carrots can be raised in this way as if planted alone. This method is well worth the attention of farmers, as it is confidently recommended by persons of experience."

In Delaware Co., N. Y., as we learn from Mr. Merreck, the ruta-baga, Norfolk turnip, and wurtzel are successfully raised for cattle. But the demand for hand labor in their cultivation so far exceeds that of any other crop as to prevent their being extensively grown where land is so cheap and labor so dear. "Of potatoes, the red or hemlock and the English white yield well, are of good quality, and have most successfully resisted the rot, of late the common enemy, which has discouraged their cultivation except for table use."

Mr. Thomas writes from Wayne Co., N. Y., as follows: "With the exception of the potato, root crops are but sparingly cultivated. A few intelligent farmers, however, find great advantage in raising ruta-bagas, carrots, and beets; the carrots are much the best. The average yield of potatoes has diminished of late years, independently of the rot, from unknown causes, and rarely exceeds 100 bushels per acre. They are more easily raised than ruta-bagas or carrots, the latter needing much more hoeing. But the amount of labor required may be much lessened by ploughing and cultivating the ground repeatedly, from early spring until seeding time, which clears the soil of weeds."

Mr. Adams, of East Bloomfield, N. Y., says: "Since the potato rot has prevailed, the culture of this crop has very much declined. They are now of too much value to feed to stock, or to use for distilling. Carrots are the most popular roots cultivated here, and are in a great measure superseding ruta-bagas, wurtzels, and sugar beets. They are raised mostly for cattle and horses. No better food can be procured for milch cows. Horses are very fond of them, and they are considered very healthy. The cost of raising carrots depends very much upon the former culture of the land, whether clean, or full of foul seed. The best way to cultivate this crop is in drills 3 feet apart, and with the plants 6 inches asunder in the rows. After the first weeding the cultivator is used. When large crops are raised the expense varies from $50 to $100 per acre, and the yield from 800 to 1300 bushels. They are worth at least 12½ cents per bushel to feed to stock."

Mr. George Blight, of Germantown, Pa., prefers ruta-bagas to carrots, beets, or any other root crop. He says: "I consider ruta-bagas the most valuable crop, from their requiring less labor; they can be planted as late as 15th July, the others only in spring. And besides, carrots need the most care during the wheat harvest, and are therefore a more expensive crop. Cost of raising an acre of carrots, about $50; of turnips, about $20. Ruta-bagas may be grown after oats."

From Granville, Ill., Mr. Ralph Ware writes as follows: "Root crops are but little cultivated, except potatoes. These yield on an average 200 bushels per acre, and the cost of production is about 6 cents per bushel. They have not suffered from the rot here, except in 1848, and a little in 1849."

In Floyd Co., Ind., as we learn from Mr. Wm. Russell, the Irish potato is a very profitable crop. It produces well, and has not been materially affected by the disease. Cost of cultivating, about the same as Indian corn, and the average product from 150 to 200 bushels per acre.

In Wisconsin, according to the report of Mr. Perkins, of Burlington, the crop of potatoes the last season was light, although sufficient were generally raised for table use. They were less affected by the rot than for several years previous. Other roots suited to the climate yield abundantly, but require so much labor that they cannot compete with the coarse grains for feed.

Mr. Benj'n Whitfield, of Tuscaloosa, Ala., writes thus: "The yam is the only root crop raised in this section of the country to any extent. It succeeds best on land rather sandy, and not too rich; such ground as would produce 20 to 30 bushels of corn to the acre. Yield from 200 to 300 bushels per acre. I have tried all the root crops for cattle, and think the yam superior to any other for that purpose. They are good food for milch cows, producing a large quantity of rich milk. They should be fed early, as they are somewhat difficult to keep."

Dr. White, of Quincy, Fla., says: "The Irish and sweet potato both do well in this climate. Average of the latter, 200 bushels per acre. Turnips and ruta-bagas also succeed well here, and yield abundant crops."

Mr. Wm. S. Keaghey writes from Jasper Co., Texas, as follows: "But few Irish potatoes were planted last spring, from the difficulty of obtaining seed. They were sold then for $2.00 per bushel. What few were planted did well, and yielded a large return. Sweet potatoes are raised here equal in quality to those grown in any of the Southern States. Of all the varieties tried, the yams and red Bermudas were the best."

POTATOES.

POTATO leaves contain 79 per cent. of water, and nearly 13 per cent. of ash, calculated dry. The stems contain 78 per cent. of water, and about 8 per cent. ash. Estimating the ash before the stems and leaves are dried, the latter has 2.63 per cent. and the former 1.735. In the tubers there is a little over 75 per cent. water, and 2½ per cent. ash, dry weight. In 100 parts of the latter, Prof. Emmons found

Silica	1.850
Earthy phosphates	21.100
Carbonate of lime	0.600
Magnesia	0.500
Potash	48.365
Soda	5.025
Chlorine	4.090
Sulphuric acid	1.200
Organic matter	2.456
Carbonic acid	15.725
	99.911

Omitting the carbonic acid and organic matter in the above table, as of little practical importance, it will be seen that the proportion of potash exceeds 50 per cent. This is an important fact, and indicates the value of ashes as a fertilizer for this crop. Mr. Salisbury found 20 per cent. of starch in one specimen of sweet potatoes, and less than 70 per cent. of water. It also gave nearly 7 per cent. of albumen and casein; and over 3 per cent. ash calculated on the dry matter.

The Southern Cultivator contains a statement of Mr. Aaron Adkins, who raised 307 bushels of sweet potatoes on an acre, at an expense of $10, or a little over three cents a bushel. The potatoes were cut and dropped into deep furrows, (on dry mellow land,) in rows three and a half feet apart, and covered with a plough. They were not hoed, but cultivated with the shovel-plough—throwing the vines over to one side for a furrow near the hills, and then replacing them and clearing the opposite side to plough that also. A small plough was run nearest the plants, and a larger one in the centre of the rows. The crop was lifted out of the ground with the plough, so that no hoe went into the field. For feeding cows while giving milk, ewes and lambs, sweet potatoes are fully equal to Irish, if not superior. It is a crop the culture of which ought to be extended wherever the climate favors its production. Professor Emmons gives the following analysis of the ash of the leaves and stems of this plant:

Silica	23.600
Earthy phosphates	28.575
Carbonate of lime	15.000
Magnesia	none
Potash	18.515
Soda	9.460
Sulphuric acid	2.785
Chlorine	2.090
	100.025

There have been sent to the Patent Office several papers of considerable length on the potato disease, which are left out of this Report, because they furnish no new information on the subject. Dr. Richardson, of Baltimore, has made what he seems to regard as a great discovery, in reference to the ravages of an insect which deposits its eggs in the stems of growing potatoes, usually in June in that latitude, which hatching furnish larvæ that eat their way downward, and finally escape near the ground. The writer has been familiar with the attacks of this depredator for the last five years, and was the first to describe and figure its larvæ. Several other gentlemen besides Dr. R. refer to this insect as the cause of the potato rot; and it destroys many thousands of bushels every year. It is not, however, the only cause of this malady. To satisfy these gentlemen that the priority of discovery is not with them, a paragraph is copied from the Patent Office Report of 1845, page 489:

"The editor of the Genessee Farmer, Dr. Lee, has made an extensive examination of the potato crop throughout central New York, and finds in *all cases* the curling and blight of the vines are attended by an insect. The parent is probably a beetle. It punctures the vine just above the ground, and deposits its egg in the pith of the stalk, where it hatches. The larvæ eat out all the stalk but the outer bark, when the stem withers and dies. Dr. Lee thinks that this prevents the ripening of the tubes and disposes them to decay. The blight, it is found, will be more severe this year than last." During the two seasons last past the writer has seen this insect and its destructive works in Georgia and South Carolina; but he is sorry to say that he has no remedy to suggest.

In regard to the cultivation of potatoes, a few remarks are deemed appropriate, founded alike on experience and scientific research. There is no closer observer of natural phenomena in western New York than Mr. John J. Thomas, who says: "The average yield of potatoes has diminished of late years, independently of the rot, from *unknown* causes, and rarely exceeds 100 bushels per acre." Evidence to this effect might be cited to almost any length. The fact is known to thousands; the cause to but few. For ten years the writer has believed and said on all proper occasions, that the robbing of the soil of its potash and other elements indispensable to the healthy organization of potatoes, has tended powerfully both to diminish the crop, and impair the constitutional vigor of the plant. A writer in the Patent Office Report for 1845, (in which the potato malady alone fills some 200 pages,) over the signature of "Chemico," says: "Dr. Lee, a scientific gentleman of New York, who is at present engaged by the New York State Agricultural Society to visit every county in that State and deliver lectures on agricultural chemistry, in a letter to the editor of the Albany Cultivator, remarks: 'More than one-half of the ashes of potatoes is pure *potash*. A sugar maple, a grape vine, a potato plant, and an apple tree, need a soil that *abounds in potash*. In every town I have found scientific farmers, who, by the use of *unleached ashes*, *lime*, and *plaster*, in equal parts, and placed in the hill with the seed, and on the hill as soon as the tops are well grown, have wholly escaped the potato rot, and harvested for several years from 500 to 600 bushels per acre.'" Having found from personal experience that this treatment, even on good sod loam, and on new ground with an abundance of rotting forest leaves, was highly beneficial, we had before recommended it.

In organizing the elements of water and carbon into starch, sugar, and woody fibre, the writer became satisfied, fifteen years ago, that the presence of an alkali or alkaline salt was indispensable. His researches were commenced for the purpose of determining, by careful weighing, what elements and how much of each were consumed in forming 100 lbs. of sound potato plants, including all that grows below and above ground. Few farmers or men of science have any definite idea how much of the substance of the earth, whether organic or inorganic, is dissolved and taken up by the roots of a crop of corn, wheat, potatoes, or in the growth of an apple orchard,

including its fruit and leaves, in the course of a season or year. It is to be regretted that the American people will not, either through Congress or State Legislatures, encourage investigations into the growth of all cultivated plants and domestic animals. If it were customary for officers in the army and navy, and others, to work for nothing and find themselves, perhaps agricultural chemists and entomologists might do the same. The misfortune is, that science, as applicable to rural affairs, is not appreciated by legislators and the public at large. Hence every dollar expended for the promotion of agriculture is so grudgingly bestowed, that gentlemen of talent and science turn their attention to military and other pursuits, which pay far better, both in honor and money.

The March number of the American Farmer, for 1850, has the following paragraphs on the culture of potatoes:

"As to the yield of potatoes, that is a thing which depends upon many circumstances, as the preparation of the soil, its character, its appropriateness, and quantity of the manure applied, the kind of potato, the culture, and upon the season as much as any thing else. In former years, the average crop was rated at 400 bushels; at a later period, 200 bushels per acre; at a still later, 150 bushels; and since the appearance of the rot, no calculation could be safely made of average products, and he who made 100 bushels to the acre felt that he had raised a good crop; few growers reached that point, while many did not save from the effects of that vegetable pestilence, more than from 30 to 60 bushels, and in numerous instances the whole or nearly the whole crop rotted in the ground. But as the disease has wellnigh abated, the farmer has a right to hope for more fruitful yields; and under a favorable concurrence of circumstances, in auspicious seasons, in good soils, well manured, well prepared, and as well cultivated, we do not see why from 300 to 400 bushels to the acre may not be calculated upon. We do know that the latter quantity has been raised upon that quantity of ground, and as what has been done can be done again, no farmer should despair of its accomplishment; but, on the contrary, set himself to work with the firm determination to raise that number of bushels on an acre."

On new land, rich in organic matter and rich in alkalies and alkaline earths, 400 bushels were a common yield. Then 200 became a good harvest; followed by 150, and down 60 and 80 bushels per acre.

Gen. Barnum, of Vermont, many years ago, raised 1000 bushels to the acre; but his process of culture involves so much toil and hand labor, that we doubt the economy of growing them after his plan. His mode was this:

He ploughed, harrowed, and rolled the ground, so as to bring it into a state of perfect tilth, having previously prepared a rich, light compost for the purpose of manuring and raising the rows as the plants should require it. In planting the sets on the surface, he had them covered two or three inches deep with the prepared compost. When the plants came up and had grown to the size of 4 inches in height, he caused his men to go through the patch, and place alongside of the rows a sufficient quantity of the compost to form a slight hilling; at the second and third workings, the hillings were increased and completed in a similar way, the compost thus smothering the weeds immediately near the plants, while the rest were removed by the hand. The middle of the rows were, during the season, kept clean by running the cultivator through them.

Composition of the Ash of Potatoes.

	Tubers.	Haulm.
Carbonic acid	13.4	11.0
Phosphoric acid	11.3	10.8
Sulphuric acid	7.1	2.2
Chlorine	2.7	1.6
Lime	1.8	2.8
Magnesia	5.4	1.8
Potash	51.5	44.5
Soda	trace	trace.
Silica	5.6	13.0
Oxide of iron	0.5	5.2
Charcoal and loss	0.7	7.6
	100.0	100.0

The above analyses were made by M. Boussingault, one of the most reliable chemists in France. If we deduct the carbonic acid, the proportion of *potash* in the ash of potatoes exceed 56 per cent. If we deduct charcoal, loss, and carbonic acid from the haulm or tops, the potash in this part of the plant exceeds 50 per cent. The inference is plain: a soil should be rich in such elements as the crop needs, one of which is potash.

As a general thing, decomposing turf, rotting forest leaves, ashes, and fresh lands, abound in all the constituents of potatoes. On the other hand, old and long tilled fields, without sod, with little mould, and less alkaline salts, yield small harvests, and in the course of a few generations so impair the vital force of this family of plants, so badly treated, that premature "rot" is reasonably to be expected. Insects hasten the work of disorganization. The *fungi*, which grow so luxuriantly on diseased tubers, are to be regarded less as *causes* than *effects* of the constitutional malady. There is an essential difference in potatoes in their ability to withstand the purely chemical forces which tend to fermentation and putrefaction. It is believed by many, that all vegetables propagated by buds instead of seeds, like the best varieties of fruit trees, sugar cane, and the tubers of the potato plant, are less able to endure any prolonged defect in their food, or in climate, than seedling plants. This department of vegetable physiology eminently deserves further investigation. The art of feeding cultivated plants is in the *embryo*—not born. Rural art, based on science, *is yet to be learned.*

CULTURE OF ROOT CROPS.—By Wm. Perry Fogg.

The real value and importance of the culture of roots as food for stock is but little understood by American farmers. It is only within a few years, since the ravages of the potato disease have directed public attention towards finding a substitute for this valuable esculent, that the field culture of carrots, beets, turnips, and ruta-bagas, has attracted much notice in this country. The value of these roots for keeping stock through the winter, and for fattening cattle, is now beginning to be appreciated by our farmers; and a few remarks on the mode of culture and land adapted to each, as well as their relative value compared with potatoes, for which they are often substituted, may be interesting and profitable.

Turnips and ruta-bagas.—In England and Scotland turnip culture, or "green cropping," forms a very important feature in the system of farming. In no other country is the culture of turnips so thoroughly studied and so well understood. As fertilizers for this crop, they use lime, guano, and bone-dust; and the yield per acre ranges from 1000 to 1500 bushels. For all root crops a deep, well-drained soil is necessary, which should be completely pulverized and rendered mellow by the frequent use of the plough and harrow. Turnips may be grown to advantage on a heavier soil than is adapted to carrots or parsneps. Of the common varieties, the *white Norfolk* succeeds best on low lands, and the *Globe*, or *green-top*, on high and dry soils. To insure a large crop, they should be sown in drills from 16 to 20 inches apart. Turnips have an advantage over all other roots, that they can be sown so late, on ground where other crops have failed. In England large quantities are grown with early peas, being drilled in between the rows before the pea-vines are removed. For no kind of stock are turnips more valuable than for sheep. The unpleasant flavor they impart to butter is a serious objection to feeding them to milch cows. The cost of culture depends upon the price of labor, &c., and of course will vary in different sections of the country. The following statement of Mr. Geo. W. Wood, of Middleborough, Mass., as to the cost and product of ½ an acre of turnips, is about a fair estimate for New England: *

Soil, clayey loam; sown in drills 18 inches apart.	
Expense of ploughing 75 cents, harrowing 50 cents	$1.25
Ploughing and harrowing $1.00, 5 days' work planting, $5.00	6.00
100 bushels of ashes $12.10, carting the same $3.00	15.10
Cultivating, hoeing, and weeding	5.50
6 days' work harvesting $6.00, seed 50 cents	6.50
Total	$34.35

Product, 435½ bushels; cost per bushel, about 8 cents.

Mangel-wurtzel and sugar-beet.—The culture necessary for the beet is essentially the same as that required by the turnip. The land should be ploughed deep, using if practicable the sub-soil plough, and well manured. Common salt has been used as a fertilizer on land where wurtzels were to be grown, and the effect was to very much increase the crop. This is readily accounted for, when we compare the analyses of the bulbs and tops of the mangel-wurtzel, turnip, and carrot, made by Prof. Way.—(*See Jour. Royal Agric. Soc.*) One ton of each of these yielded of *common salt* the following proportions:

	Roots.	Tops.
Mangel-wurtzels	5.29	12.82
Carrots	1.42	11.25
Turnips	1.49	6.15

In one instance the application of three cwt. of salt to an acre, not with the intention of benefiting the crop, but to destroy the grub-worm, resulted in an increase of the yield from twenty-six to forty tons,† thus showing the necessity of supplying to plants these mineral elements essential to their growth, and which exist in the soil in minute proportions.

* Transactions of Plymouth Co. Agricultural Society.
† Quarterly Journal of Agriculture, Edinburgh, No. 27, p. 177.

As the seed of the beet is inclosed in a large rough shell, it should be steeped for at least 48 hours before sowing. This is especially necessary when the ground is dry; otherwise the seed will lie a considerable time before sprouting, if it grows at all. The rows should be from 24 to 30 inches apart, so as to leave sufficient room for a horse-hoe or small plough to pass between. About 4 lbs. of seed are required to the acre. Beets are more exhausting to the land than turnips or carrots, and do not leave the ground in as good condition for the succeeding crop. They contain more nutritive matter than turnips, and as food for milch cows, and for fattening cattle and hogs, they are very valuable. The skillful fattener of stock always feeds cut hay, straw, bran, or some other dry food, along with wurtzels, turnips, and carrots, as the former contain a considerable per centage of oily matter, which contributes towards fattening the animal, and they also counteract the loosening tendency of the roots. When fed to hogs, they should be cut fine, steamed, or boiled, and mixed with a little corn-meal or bran. In this way they will go nearly as far as the same weight of potatoes. Even supposing the nutritive power of these roots but two-thirds that of potatoes, when we take into account the difference in the average yield per acre, the balance is decidedly in favor of the roots.

Carrots and Parsneps.—Of all the root crops, carrots are decidedly the most popular in this country for field culture, and they certainly possess some advantages over all others. They are easily raised, and on suitable land yield abundantly. They grow well on light soil, where neither beets nor turnips would succeed, and, if properly managed, require no more labor in their cultivation than other roots. Almost all domestic animals eat them with avidity, and horses especially are extremely fond of them. When not very hard worked, they thrive well if fed wholly or in part on this root, and they can thus be kept through the winter at one-half the expense of feeding oats. As a winter food for milch cows, both carrots and parsneps are unsurpassed for the quantity as well as quality of the milk and butter produced. Indeed, carrots are more generally valuable than any other root, except the potato; and for feeding to stock, are the best substitute for this which has yet been tried.

In France, where the carrot and sugar-beet are extensively grown, the land is usually ploughed twice in the fall, and about half the manure then applied which is intended for the whole crop. It remains in this condition until spring; and then, as early as the weather will permit, it is again ploughed, after spreading on the remaining half of the manure. It is then levelled off and frequently harrowed until the soil is rendered light and friable. For carrots and parsneps the soil should always be deep, with a sub-soil through which the root can easily penetrate. As they run deep into the ground, they derive most of their nourishment from below, and do not much exhaust the organic and mineral elements in the surface soil. The seed should be sown in drills at about the same distance as turnips. The plan adopted by some is to make the rows alternately 12 and 24 inches apart, so that they can run through every second row a horse cultivator or corn-plough—and this method is found to save much labor in their cultivation. The suggestion of Mr. Clarke, of So. Kingston, R. I., in the preceding extracts on Root Culture, (page 260,) viz: to sow carrots and onions in alternate rows, is well worthy of consideration. For sowing carrots or any other seeds of this kind, a seed-drill should be procured if possible. The labor and expense saved in sowing a single acre would nearly pay the

cost of the drill. The next important point is to keep them free from weeds; and this is the part of their culture most dreaded by the farmer. Indeed, the fear that weeding them out will constitute too severe a tax upon their time and labor, deters many from cultivating extensively this, or any other root crop. The seed should not be sown until late in the spring, when the ground has become sufficiently warm to cause it to grow at once. They will thus get the start, and keep ahead of the weeds, and require less care. The first time they are weeded out, let them be thinned so as to stand three or four inches apart in the rows. One thorough weeding is usually sufficient, except on very foul land, which should never be cultivated in this crop. Afterwards an occasional use of the horse-hoe or cultivator is all that is necessary.

They should be allowed to remain in the ground late in the fall, as they become in some measure hardened to the cold, and keep better than if harvested early. They can either be piled up in the field and covered with straw and then with a thin coating of earth, or stored away in the cellar for winter use. The parsnep does not require to be taken up and stored in winter. But when the frost is coming out of the ground in spring, at a time "between hay and grass," when all kinds of fodder are getting scarce, they can be ploughed out and fed to stock, and will then be found exceedingly valuable.

Analysis of the Ash of Roots.—It is important that the farmer should know what mineral elements are contained in the grain, hay, roots, or other products of his soil; and how much of these minerals he removes from his land in every hundred pounds of these crops. For unless there exists in the soil an *unlimited supply*, (which analysis shows to be impossible,) it must, after successive croppings, become exhausted in the essential elements of plants, and cease to be productive. In England, where this subject has been closely studied, it is now considered the leading idea of scientific farming, to supply, in guano, bone-dust, or special manures, the same mineral elements in as nearly as possible the same proportions in which they are required to form the given crop.

The following table shows how many pounds of each of these minerals are contained in *one ton* of the bulbs, and of the tops of turnips, beets, and carrots—being the average of several analyses of these roots made by Prof. Way:—

	In one ton of the Bulbs.			In one ton of the Tops.		
	Turnip.	Beet.	Carrot.	Turnip.	Beet.	Carrot.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Silica, (flint)	.34	.54	.24	1.78	.76	4.46
Phosphoric acid	1.77	.66	1.78	2.60	1.94	1.64
Sulphuric acid	2.38	.65	1.81	3.46	2.20	5.61
Lime	1.76	.41	1.77	11.29	3.31	30.24
Magnesia	.47	.48	.80	1.16	3.27	2.58
Peroxide of iron	.07	.12	.22	.72	.52	2.36
Potash	6.07	4.99	6.59	6.08	7.86	6.64
Soda	1.46	3.02	2.71	1.12	2.52	9.67
Chloride of sodium, (common salt)	1.49	5.29	1.42	6.15	12.82	11.95
Chloride of potassium	......	......	......	2.02	......	......
	15.76	16.11	16.79	36.33	35.20	75.15

Comparative Value as Food.—Without giving a full analysis of the organic part of these several roots, their relative value as food of animals can be judged with some degree of accuracy from the statement given below of the amount of water and of solid food contained in 100 pounds of potatoes, turnips, beets, and carrots.

	Potatoes.	Sugar Beets.	Mangel Wurtzel.	Carrots.	White Turnips.	Ruta-Bagas.
Water	75 lbs.	85 lbs.	85 lbs.	86 lbs.	90 lbs.	88 lbs.
Solid Matter	25	15	15	14	10	12
	100	100	100	100	100	100

The above estimates are about the average, although the proportion is found to vary slightly in different samples of the same root.

RAISING POTATOES FROM THE SEED.

We have availed ourselves of the substance of a Report made by the Hon. Charles E. Clarke, to the Jefferson Co. (N. Y.) Agricultural Society, in the fall of 1849. On the subject of the decay of trees, bulbs, tubers, and roots, Mr. Clarke says: "It is a principle that plants, which are usually propagated from the bulb, root, or tuber, lose after a time their procreative or vivifying power, and it is necessary to resort to the original element or seed. The *hop* would lose much of its strength and productiveness, except for the introduction of an occasional male plant. The *dahlia* requires to be renewed, and it is impossible to preserve for any great length of time any particular species of apple or pear by continued engrafting. The bulb, the tuber, and the tree all grow old, and require to be renewed from the seed. This principle is strikingly illustrated in the case of the Lombardy poplar, now in a state of decay all over the United States. This tree, from the luxuriance of its growth, the symmetry of its proportions, and the beauty of its foliage was an universal favorite, and gained the name of the "tree of civilization." It was brought to America by the late Chancellor Livingston, about forty-five years ago, and has been propagated from cuttings alone. The female tree only was introduced, and it now bids fair to become extinct.

"Without inquiring whether the rot which has so extensively prevailed in the potato crop is owing to the fact that it is cultivated from the tuber, and not from the seed, it is true that certain varieties of the potato *do* resist the disease more than others. It is desirable to ascertain whether new varieties raised from the seed are less liable to be attacked by the disease than old, and experiments should be extensively tried, and the results carefully noted.

"It becomes therefore desirable to know the best mode of propagating the potato from the seed. For this purpose, select good, fair-sized, ripe potato balls, from the best varieties of potatoes, cut the balls open, and wash the pulp containing the seed in water, until the seeds are entirely separated from the pulp and perfectly clean, then strain them out of the water and dry them; examined with a microscope, they have the appearance of the seeds of the summer squash. The seed should be started in a hot-bed, so that the plants will be about three inches high when the weather

is so warm that there is no danger from frost. They should then be carefully transplanted into warm, rich, and mellow earth, and set in drills 2½ feet apart, and 10 inches from each other in the drill. The vines of potatoes thus set by me in 1849 grew strong and thrifty, 3 feet in height, blossomed, and bore balls, from which I have now the seed. Many of the potatoes attained a fair size, weighing in many instances six ounces each, and were good edible potatoes. In one season I have thus obtained over one hundred varieties."

Mr. Clarke adds: "That for two successive years the potatoes raised from the seed have been in no wise affected by the rot, and if there was not a potato in America, I should not despair of having a tolerable supply of good edible potatoes the first year from the seed. The common impression that three years are necessary to propagate potatoes from the seed is erroneous, and I impute the rapid growth and large size in the instance alluded to, to the perfect mode of saving the seed, and to high and judicious cultivation.

"It is an historical fact not generally known, that in the year 1742, there was in Ireland a disease similar to that which has prevailed of late years; and that the potato crop was cut off, and great distress, famine, and pestilence followed."

By the kindness of B. P. Johnson Esq., secretary of the N. Y. State Agricultural Society, we have received proofsheets of the volume of Transactions of said Society now going through the press, from which we condense the following: Mr. Aaron Killam, of Mexico, N. Y., has had great success in growing tubers from the seeds in potato balls. Tubers produced from seeds gave 175 lbs. of excellent potatoes to the square rod, and 230 bushels on a half acre; although an early frost killed the tops before the plants had ceased to grow. Mr. K. says: "I ploughed the land six inches deep, planted the potatoes three inches deep, leaving the hills level with the earth; and I planted the rows three feet apart, with the hills two feet from centre to centre, making 44 hills to the square rod, and 7841 to the acre. Allowing 14 hills to the bushel, as some of mine yielded, gives 500 bushels to the acre. *I fully believe, that if I had had seed from the balls sufficient to plant an acre, and cultivated them as I did what I planted, they would have produced at least* 500 *bushels*." We take this occasion to repeat, what we have said elsewhere in connection with an analysis of potatoes, that *wood ashes*, in addition to a rich mould, are exceedingly valuable as a fertilizer for this crop.

ORCHARDS, FRUITS, &c.

"*Orchards, Fruits, Transplanting of Trees, &c.: also Cultivation of the Vine.*—Information on these and kindred subjects, will be of universal interest." [*Circular.*

In another place will be found several valuable communications on the above subjects, which will be read with interest by the orchardist and fruit grower. We here give a few practical hints on the transplanting of trees, &c., derived from the experience of those in various parts of the country who are striving to improve and extend this very important branch of rural industry.

Mr. R. A. Merriam, of Topsfield, Essex Co., Mass., writes as follows: "I have paid considerable attention to the transplanting of apple and pear trees. Both require well cultivated ground; and for the latter the land can hardly be made too rich. I have succeeded to my entire satisfaction in an experiment with wild pear trees taken from the forest. I have tried them of all sizes, from 3 to 30 feet high, cutting off the tops, transplanting and grafting them at the same time. The scions will grow from one to two feet the first year. Apple trees I prefer to take from the nursery, in the same or a more northern latitude. After being transplanted once or twice, as they usually are in the nursery, they have a much large rquantity of fibrous roots than those that have never been transplanted. The latter often have long tap-roots, which, in trees two or three years old, I have sometimes found to run 4 or 5 feet into the ground. I last year transplanted 200 young trees, 20 or 25 feet apart, covering two acres of ground. I dug the holes 4 or 5 feet square and 1½ feet deep. I mixed with the earth around each tree about a bushel of meadow-muck, well rotted; and thus far I am very well satisfied with their progress."

Mr. J. J. Thomas, of Macedon, Wayne Co., N. Y., who stands deservedly high as a skillful fruit grower, as well as a scientific and practical farmer, writes us as follows: "There has been shown for the past few years an astonishing increase of interest in the planting of fruit trees, in this section of the State. This is an excellent *apple* region. Peaches fail about one year in five. The trees live 20 to 30 years, but do not bear well when old, from a general neglect of the *shortening* in pruning. Pears suffer much from *fire-blight*, especially on very rich ground. The *Virgalieu* or *White Deyenné* is the most profitable variety; the product of single trees often bringing $20 to $30 per annum, to be sent to New York city. Plums do best on clay soils; cherries, quinces, hardy grapes, and strawberries, all succeed well. Raspberries are rather uncertain on light soil. Apricots succeed well if protected from the curculio.

"Enormous crops of apples are yearly sent East by the Erie Canal. The present season was the most unfavorable one for a series of years—not one-fourth of a crop—price of apples this year 50 cents per bushel. At 25 cents per bushel, the usual price, I have known orchards in favorable seasons to yield $100 per acre, for a single crop. The *Rhode Island greening* is the most celebrated and productive market variety. Single trees of this sort I have known, in several instances, to yield 40 bushels.

"In transplanting young trees, great loss is usually sustained by neglected after-culture, or by grass or grain crops among them—clean, mellow, and

enriching cultivation would bring them into bearing in *one-third* the time usually required."

Mr. L. Smith, of Sullivan Co., N. Y., says: "I have for the last ten years practiced grafting some of the best varieties of plums on wild-plum stalks, with good success. They grow very thrifty, retaining all the fine flavor of the parent tree, and are entirely free from those diseases to which the plum is subject."

Mr. R. C. Holmes writes from Cape May C. H., N. J., as follows: "Apples, pears, and peaches of all kinds flourish well in this section. We have here a kind of pear, known as the *Cape May pear*; which I have never seen in any other part of the country. It is as large and as yellow as an orange. Keeps all winter, and is as juicy as the *Catherine* or *butter pear*. It bears well, and I think it is preferable to any of the French pears now being introduced. It is hardy, and equal to the quince for preserving. I have pear trees on my farm nearly 100 years old, loaded with fruit, which this year is small from the large quantity."

Mr. A. Fahnestock, of Lancaster, Ohio, writes thus: "The subject of fruit culture is one of the greatest importance, and to do justice to it would require a volume. I can here only give a few brief hints. In setting out orchards, select trees two years old from the graft—dig a good sized hole 2 spades deep, set the tree, and incorporate with the earth around it some well-rotted manure; cultivate the soil, but not with high crops. The trees will be benefited by applying every spring *Blandy's wash;* consisting of 3 gallons strong lye, 1 pint whale-oil soap, ¼ lb. saltpetre, and a handful common salt. No crops are more profitable to the farmer than orchards of early and late fruits. Peaches are worth in Columbus $2 to $3 per bushel; and in Cincinnati, as I am informed, they are never sold less than $3 to $5 per bushel. A peach orchard of some hundred acres at a fair distance from Cincinnati, with the view of supplying that city, would be a capital investment.

"In transplanting peaches, select trees one year from the bud. They should be examined twice a year, taking away the earth for a few inches from around the bark, and destroying all the worms that may be found. At the same time half a spade full of ashes or slaked lime may advantageously be applied to the tree."

Mr. John Kuhn, of Ashland county, Ohio, says: "Transplanted trees always succeed better if the earth is kept moist about their roots. This can be done by applying a light coating of coarse litter, as straw, chip-dirt, or rotten wood, on the surface around the body of the tree."

Mr. John Bell, of Floyd county, Ind., says: "The apple and peach are extensively cultivated here, and with considerable care. Our soil, climate, and convenient situation for market, offer inducements to fruit growers that are not entirely overlooked. We raise and ship south from this county, in favorable seasons, considerable quantities of green and dried fruit. Last year the crop was a failure here as elsewhere, from the severe frost in April. The curculio has been very severe on plums and nectarines, and we have made several experiments, as yet without success, to prevent their depredations."

On vine culture, Mr. Bell writes as follows: "This branch of husbandry is beginning to be better understood than formerly. Several small vineyards have been commenced, which succeed very well. The Catawba is considered the best grape for out-door culture in this climate, and less liable to mildew than the Isabella. Some of our German citizens, who practice not only a spring or autumn pruning, but also a judicious summer pruning of the vines, succeed admirably."

Mr. A. B. Florer, of Newport, Ind., says: "The apple, peach, and cherry do well in this climate. The usual time of transplanting is in April and November. I think the latter preferable. We have here all the best grafted varieties of fruit. Pear trees usually die, when ten years old, from the *blight*. Prairie orchards should be seeded down in clover, and should never be ploughed, for the roots run near the surface of the ground, and ploughing exposes these to the frost in winter, and to the drought in summer, both of which impede the growth of the tree."

In Racine county, Wis., "Fruit trees," says Mr. Perkins, "such as apples, pears, and quinces, are yet mostly young, but grow vigorously, and appear less inclined to produce fruit than a large growth of wood. They need root-pruning, or something to check the exuberant flow of sap. On some light hard soils, they bear abundant crops of fine fruit. Peaches generally do not succeed well, and in most places the crop is very precarious. Plums, some of the hardy varieties of cherries, currants, &c., bear profusely, and the fruit is of finer quality than I ever saw in the older States. The culture of the grape has as yet received little attention, although our soil is said to be well adapted to it, and in sheltered situations we have raised fine crops of the Isabella, and other early varieties. The wild grape is very plenty throughout the country."

The cultivation of the vine in Texas is thus spoken of by Mr. W. S. Keaghey, of Jasper county: "The vine, above all other fruits, is bound to succeed in this section of the country. A neighbor of mine, Dr. Seybold, a Prussian emigrant, has a small vineyard of about 100 plants, now four years old. They have borne two crops every year until the present, when, through the unusual quantity of rain, the second crop did not ripen. They are of the Isabella variety, and the wine is of fine flavor, and sells in the shops for Madeira." Mr. Pryor Lea, of Goliad, says: "But little attention has as yet been paid to the culture of grapes. One fact is established, however, that wine of excellent quality can be made from the Mustang grapes, which abound in all parts of the country. Some foreign grapes have already been introduced here, and succeed well. All this section of country will, without doubt, in time produce a variety of good wines. Southern fruits of all kinds promise well. Figs are yet bearing, (Nov. 22.)"

CULTIVATION OF APPLES IN THE NORTHERN STATES.

(BY HENRY F. FRENCH.)

It is a cold climate, this of New England, where we have frosts in nearly every month in the year; and it is a rough and stony land, compared with the regions of the South and West. Cotton, tobacco, and rice will not grow among us, and we cannot compete with other sections of the Union in the culture of wheat and corn, even; and many are inclined almost to curse the soil as ungrateful, and give over New England to the manufactures and the arts. Many regard agriculture among us as an unprofitable toil to the poor, and an expensive amusement to the rich; and it surely becomes every man,

when he may, to speak a word of encouragement to the owners of New England soil.

It is my belief that one of the true sources of agricultural wealth at the North, is to be found in the cultivation of apple orchards. It has already become a prominent object of attention in some parts of New England, and requires only to be appreciated to become vastly more interesting as well as profitable. But facts are more valuable than theories, and I will illustrate my idea of the profits of apple growing by a statement of what I know about two small orchards in my native town of Chester in the interior of this county of Rockingham; and I give the statement not as extraordinary at all, for I think hundreds of instances of greater profits might easily be found; but I give them merely as illustrations, and as a safe basis of calculation.

One of the orchards referred to is owned by Mr. Joseph Robinson. It covers about two acres of land. The trees are only from twenty to twenty-five feet apart, so that the branches are much interlaced, and the fruit is principally the Baldwin and Russet. The product, in 1849, was 260 barrels of marketable apples, which were sold at home at $2.62 per barrel, giving more than $680; and this may be reckoned net profit, as the fruit of inferior quality would pay all expenses of care of the orchard, and gathering the fruit.

In the year 1847, Mr. Robinson refused the offer of $600 for his apples *upon the trees*, to be gathered by the purchaser. This was an uncommonly profitable year to Mr. Robinson, because the general scarcity of fruit gave to his an additional value: but they show pretty distinctly what *may* be done. Upon careful inquiry, I am satisfied, that the net income of his two acres has averaged $300 a year for ten years past, and see no reason why it should not be as great for twenty years to come. This is the interest of $5,000, or a pretty satisfactory income, considered as the bountiful gift of our mother earth, whereby our neighbor is not rendered poorer, and no man has lost that which we have gained. I have charge of a small orchard in the same town, covering about half an acre. In 1847, I selected eight barrels of the fruit of it, and sold the remainder for $100 on the trees. In 1849, I gathered fifty-five barrels, for which I realized $125 above all expenses of care and cultivation for the year. These are small matters compared with grand operations in wheat fields and cotton plantations; but these smaller matters make up the wealth of the country. The hay crop, so important an item in our national income, is principally produced in this way, by small farmers in small quantities.

I will now give you briefly the mode of planting and cultivating apple-trees most approved in this county.

Select any soil, not so low as to be saturated with stagnant water, nor so sandy as to be dry. A granite soil is as good as any, and a slate soil perhaps equally good; but for convenience of cultivation I should prefer land not very stony. Subsoil it to the depth of eighteen inches, if practicable, and if not, plough as deep as possible, and excavate places for the trees eighteen inches deep, and six feet in diameter, and make the soil thrown out rich with compost manure before replacing it. Plant the trees, which should be two or three years from the bud, in the spring or autumn, as is most convenient. Many persons much prefer the spring, and no one, I believe, *prefers* the autumn. I have myself set them in both seasons, and have discovered no difference. Set them thirty-three feet apart, which will give forty trees to the acre. Keep the land under cultivation with hoed

crops, until it is too much shaded to be productive, and then let it lie fallow, with ploughing and harrowing enough to keep down the weeds. Apple trees will not thrive in sward land, I mean in land kept in grass. In all parts of the country, fruit trees set in grass land may be seen struggling desperately for dear life, and of no value whatever except as a warning against similar folly. It is true that if trees be forced to a very rapid growth, they will often be for a time unfruitful. To check this exuberance of wood, and render the trees fruitful, laying the land to grass for two or three years may be a necessary regimen, on the same principle that checking the circulation of the sap by bending down the limbs will force out fruit buds. Trees should be pruned high enough for cattle to pass under them in ploughing. They should be washed twice a year with soft soap and water. The borer is a troublesome enemy with us, and a cause of sure destruction, without great care. A wash of soap and water, or a solution of potash, will destroy the eggs of most insects; and the worm may be killed with a wire, by careful attention, as soon as he commences his work. He remains in the grub for two years, and during the first makes but small progress in his labor, and may be easily destroyed.

Apple trees, well cared for, will commence bearing in three or four years after setting, and in eight or ten years produce a good crop, and will endure for generations. Mr. Robinson planted his orchard fifty-five years ago, and still enjoys the fruit of his labor.

Trees highly cultivated will mature and decay, doubtless, much sooner than others; but a quick return is, on the whole, the true economy in the matter.

As to the species, I recommend the Baldwin and russet for this latitude for market fruit, because they are good bearers, and in season after the fruit raised farther south has gone by, and therefore command a higher price. Baldwins, in New Hampshire, are in season in January and February, and our russets are in perfection until June, so that we have scarcely any competition in the market. For exportation probably no fruit in the world is superior to that produced in our cold latitude.

One fact in regard to the Baldwin apple has attracted much attention, and is deserving of investigation, namely, that it bears, generally, throughout New England, only in the even years, as 1846, and 1848; while in the odd years its product is very small, not one-fourth as much. The small orchard under my care is an exception, and most, though not all, the trees bear plentifully in the odd year, and it is not very uncommon to see instances of the kind. Whether this be induced by the peculiarity of some season which has destroyed the fruit buds, and so brought the trees into bearing the succeeding year, or whether that species of apple, on some principle like that of the transmission of depravity from our first parents, has an innate propensity to fruitfulness in even years, I will not undertake to say. The fact is indisputable, and Baldwin apples are worth twice as much the odd year, by reason of their scarcity. The russet is not a great bearer, but bears every year. Most of the great bearers are fruitful only in alternate years. The bearing year of trees generally may be changed by removing the blossoms one year, or by any cause, natural or otherwise, which shall prevent the fruit maturing. Whether the experiment would succeed with the Baldwin is not to my knowledge ascertained.

From an acre of orcharding of forty trees, under proper treatment, at maturity, say twenty years from transplanting, one hundred barrels of fruit

would be a small crop, and its value ranges from one to three dollars per barrel. Throughout New Hampshire an abundance of suitable land may be had for twenty dollars an acre. The first cost of trees and setting out will not exceed twenty dollars an acre, and for several years, and until the trees commence bearing, the cultivation of the land for other purposes will be very little obstructed by them. The selling price of land is increased every year by their growth, and there can be no doubt, that with the facilities of steam navigation, the demand for apples, and especially those of northern growth, will increase beyond any present prospect of supply.

Now, why does not the subject receive its due attention? Why does not every farmer in New England plant an orchard forthwith, and while he surely adds to the value of his estate, provide a source of unfailing interest and satisfaction for his declining years? I have regarded the matter in a pecuniary light merely; but other considerations, perhaps not adapted to this occasion, will occur to every reflecting man. An influence is much needed in New England to counterbalance the roving propensity of her people; an influence which is nowhere so surely found as in the strengthening of home-ties by the union of labor with the works of nature. He who has planted a tree, will he not desire to eat of the fruit thereof? and he whose father has raised it, will he not feel it to be almost sacrilege to give it into the hands of strangers?

Patriotism has no basis so secure as in the love which man has for his home and the home of his fathers.

Exeter, New Hampshire, *March* 4, 1850.

ORCHARDS—THEIR CULTIVATION AND MANAGEMENT.

(BY ALLEN W. DODGE.)

In accordance with a request made to me by John S. Skinner, Esq., of Philadelphia, I herewith furnish you with some remarks on the fruits, and the cultivation, care, and arrangement of orchards in New England, and especially in Massachusetts. It cannot be expected that much valuable information on this subject can be communicated, that is not to be found in the books; but such as has been gleaned from these and from my own experience in raising nurseries of fruit trees for the last ten years, for sale, and from frequent conversations during this time with skillful cultivators, is at your service.

The cultivation of fruit trees has of late received a far greater and more general attention in this country, than at any former period in our history. The public mind has waked up to the importance of this subject, and in some sections is roused even to a sort of enthusiasm upon it. To whatever cause or causes this new movement in fruit culture may be ascribed, such is unquestionably the fact. Books and periodicals in large numbers have been called into existence, devoted mainly to the diffusion of information on this subject. New varieties of fruits have been imported from abroad, or raised from the seed at home; and fruits of rare merits, which before were known only in districts where they originated, have been disseminated far and wide.

Nurseries of fruit trees, which formerly were confined to a few hands only, have now sprung up all over the country, so as to meet the increased demand for young trees, and, by a healthful competition, to place them within the easy reach of the humblest farmer and mechanic. Everybody who owns a spot of land, however small, is on the alert to plant upon it fruit trees; and this done, is year after year busy in providing for their health and growth. In a few years he begins, if his labor has been well directed, to witness the result of his efforts, in rich fruits—to him all the richer because of his own raising. The vast amount thus, within a short period, added to our national wealth and happiness, it would be difficult to compute. Suffice it to say, it is no speculative or visionary scheme; but a safe and permanent investment that will yield golden dividends, so long as our soil and seasons shall continue to be as propitious as they have heretofore been.

In New England this increased attention to fruit culture has been most conspicuous. The climate, with its late springs and early cool autumns, favors especially the growth and maturity of winter apples; and to these the cultivators have mainly directed their efforts. Other fruits, such as the pear, the peach, and the cherry, receive far more attention than in former years, but to a limited extent, compared with winter apples. These, indeed, may be considered the staple fruit of New England. They constitute by far the larger proportion of the orchards, which are to be seen in such numbers on her plains and hill-sides. The demand for winter apples has kept up with this new zeal in raising them, and has given to it diffusion and activity. The home market is not yet glutted, nor fully supplied; though alarms to this effect have continued to be sounded by those who are ever looking on the dark side and foreboding evil, whenever any thing is attempted beyond the horizon of their narrow vision. But to such as watch the signs of the times—such as mark the growing population of our widely extended country, and note the popular taste for good fruit strengthening by what it feeds upon, these alarms pass as the idle wind.* These men continue to plant new orchards and to cultivate and renovate old ones, in full faith that they shall not labor without a reward.

The care and management of orchards, in this section of the country, constitute no inconsiderable part of the work of a farm. The notion that a fruit tree will live and flourish, on being thrust anyhow into the ground, and left to take care of itself, has here long been exploded. Equal pains and cultivation are now bestowed upon orchards as upon tillage land, with the knowledge that, without these, good crops of large and fair fruit can no more be raised than good crops of corn or potatoes. A small number of trees well taken care of, are found to be more profitable than a large number neglected or poorly cultivated. In forming an orchard, the first object is to bring the ground into good tilth, by cultivating it for a year or two with hoed crops. This is unquestionably the better practice, though orchards are frequently planted in land newly broken up. In the former case, the young trees find at once a good mellow soil in which to strike root; in the

* Besides the home market for fruit, the constant and rapid communication by steam between this country and Europe would seem to open for our long-keeping winter apples a demand abroad, of which the most sanguine can hardly conceive. The shipments that have been made to England warrant the conclusion, that a well-keeping, juicy apple would have there an immense sale. And if ice—another product of New England—can be transported to the East Indies, so as to pay a good profit, why may not the apples seek the same market, and with similar success?

latter, they may live, but they must wait for the soil to be made rich and fine by cultivation, before they can flourish. Thirty feet is about the distance apart at which trees are usually set in an orchard. If planted much closer together they obstruct each other, and run up tall, instead of spreading their branches wide, as is the habit of most apple trees, if space is allowed them.

The holes in which the trees are set should be dug wide enough to admit all the roots without bending, or diverting them from their natural direction, and if somewhat wider all the better. The subsoil or dead earth should be removed from the bottom at least a foot deep in shallow soils, and its place supplied with good surface soil, or compost. A compost of well rotted manure and meadow mud is admirable for this purpose, and for filling the hole when the tree is set. Care should be taken not to set too deep. The roots need the influence of the atmosphere—of light and heat, as well as of manure and rains—and languish if buried below this influence. It is a safe rule to set no deeper than the tree stood in the nursery, and this can be easily determined by its appearance at the base. Two persons are needed to set out a tree properly—one to hold it steadily (without shaking it) in its true position, and the other to place the roots and the soil around. Every fibre should be extended in its proper direction, level and not dipping, and carefully surrounded with the compost. No vacant places or cavities should be left in covering the roots, nor injury done to them by the hand or spade. In filling in the soil or compost upon the roots, it is best to throw from the roots to the circumference of the hole; as in this way the roots are less liable to be deranged from the position in which they have been placed, than by the opposite practice. After the hole is two-thirds filled, some cultivators pour in water sufficient to moisten and settle the soil, but the more common practice is to dispense with water altogether. When the soil is level with the surface, tread it down, and if it be in the spring, cover with mulch or litter of some sort, but remove it in the fall, lest it form a harbor for mice. This mulching of newly transplanted trees is by all means to be recommended, as it generates and retains in the ground a sufficient degree of moisture to carry them safely through the long and severe droughts that often occur in summer.

As to the size of trees suitable for planting in an orchard, such as are of two or three years healthful growth from the bud or graft are preferable to those of greater size and age. The larger the tree, the larger and more numerous its roots, which are consequently the more exposed to injury on being removed. A tree should not be taken from a soil much richer than that to which it is transferred. If it has been accustomed to a plenty of good food, it will pine for want of it, as surely as any animal under similar circumstances. Newly transplanted trees will sometimes rock in the ground for want of sufficient roots, so that no new fibres can be formed, and they will then cease to grow. If this happens, a few heavy stones buried in the soil, near the tree, will give to it the necessary stability. The soil may be left around the tree, if planted in the spring, a little dishing to catch the rains; and if it be in the fall, a mound of earth heaped about the tree serves the double purpose to throw off the water and support the tree in winter. This, however, should be levelled on the return of spring. With regard to the question whether spring or fall planting is preferable, a difference of opinion exists, but the latter is never recommended on moist and heavy lands. On all other soils both are practiced

with success, though by far the larger number of farmers set out their orchards in the spring. But if a very dry summer follows, spring planting is more liable to a failure than autumn. When the latter is practiced, it may be done at any time after the leaves begin to fall, and while the ground is unfrozen; when the former, after the ground has become settled and warmed, and before the leaves begin to expand.

As to the soil adapted to the culture of the apple, it may be made to grow and even to flourish on almost every description, though it succeeds best on mellow deep soils. If the soil be thin, it must be enriched—if wet, it must be thoroughly drained—if dry and gravelly, apply plenty of meadow mud with the other dressing—if rocks abound, they will render good service in promoting the growth and productiveness of the orchard. It must be remembered, however, that some kinds of soil are more suitable than others for particular kinds of apples. The Roxbury russet and the Hubbardston nonsuch, two of our most celebrated winter apples, require a strong clay loam to produce large and fair fruit; whilst the Baldwin, which stands confessedly before all other winter apples in New England, fruits well and gives the finest flavored apples upon a soil of a light loamy nature. The experience of any fruit-growing district soon teaches the varieties best adapted to its soil, and the practice of intelligent cultivators is conformed to that experience.

The location of an orchard should not be so elevated as to be exposed to the full violence of the winds and storms. In other respects, an orchard may occupy any position that will best suit the convenience of the farmer. Some recommend a northern, and some a western exposure on a hill-side; but on farms lying on the southern or eastern side, there is no other choice left, and these, so far as my observation extends, are as good as any. Indeed, the multiplicity of rules on this and other points laid down in the books will often embarrass the beginner, unless he keeps his eyes open to what others have actually accomplished, and exercises his own judgment and common sense. When the orchard is set out, and every thing done in the matter of transplanting to insure success, the young orchardist must not rest in the vain expectation that his care and labor are no longer needed—that his trees will thereafter take care of themselves and come into bearing with no other help than the start thus given them.

A tree does not, like corn and other cultivated crops, attain its growth and perfect itself in a single season;—nor in two seasons, nor a dozen. It is long in reaching maturity, and, with proper care and culture, will long remain vigorous and fruitful. The orchardist should, therefore, exercise due forecast, and from year to year see to it that the ground is properly stirred and manured, if not on the entire field, at least around every tree. He should ever bear it in mind, that it is only by good culture that he can be sure of the thriftiness of his trees, and of the abundance and good quality of his fruits. In a word, the great secret of a profitable orchard is good culture and good manure; the one opens the soil to the influence of the atmosphere, the light and heat, the dews and rains; the other supplies to the soil the food needful for every new crop of fruit, and which is, to some extent, exhausted by every crop taken from it. The thriftiest and most productive orchard I have ever seen was kept every season under cultivation;—it was ploughed, manured, and planted to some crops, (such as white beans, or fodder-corn,) not of an exhausting nature; and from it 1500 barrels of large merchantable apples have often been gathered in a single year. On

inquiring of the owner why he did not keep it in grass, as the soil was admirably adapted to the growth of the best English hay, he replied that he could not afford it—it would pay better by his present system of management than by any other. The trees in this orchard, though of considerable age, were so thrifty that their bark was as smooth and glossy as if it had been polished—no cracks, moss, nor shaggy exuviæ were to be seen upon it. How striking the contrast between such trees and those that have been neglected or poorly cultivated, no one who has even witnessed it, needs to be told; and not less striking is the contrast between the profits of the two descriptions of trees. When swine will fatten without good food—when cows will yield large messes of milk without rich pastures—when steam-engines will go without being supplied with fuel—then may we expect to behold orchards without manure or cultivation growing vigorously and yielding good crops of large and fair fruit.

The fear is sometimes expressed, that orchards may, by high culture, be forced to a premature old age. In ninety-nine cases in a hundred, there is not a shadow of danger in this respect. But granting that there may often be danger here, far better that our orchards should yield a large income for twenty-five or fifty years in succession—and then die, than that they should linger along to a hundred, without half remunerating the owner for his land and labor. No, there is nothing to be feared from the high cultivation of fruit trees—the fears are all the other way. The man who doles out to his orchards a scanty supply of food, gathers accordingly; while he who manures bountifully, has bountiful harvests. And this fact is of the more consequence to the farmer, as large and fair fruit will always command a quicker sale and larger prices than that of ordinary quality; and as the market becomes better supplied and competition more active, this difference will become greater.

Other things besides good culture are essential to the success of fruit-growing. The orchard must be guarded from cattle and sheep, and protected from the ravages of insects. Unceasing warfare must be waged against the caterpillar, and especially the canker-worm and the borer. The habits of these insects and the means of destroying them are well known—all that is wanting is energy and perseverance in applying that knowledge. The orchard must be judiciously pruned, not severely as is too often done; decayed and interfering limbs and suckers being almost the only ones to be removed, and these nicely severed with the saw or knife, and never hacked off with the axe. In the gathering of the fruit, too, the utmost care should be observed—every apple that is intended to be kept any length of time should be picked by hand, and laid carefully in the basket, and this should be as carefully emptied into the barrel. The pains thus taken with the fruit until it is offered for sale in the market, well repays the careful husbandman. His fruit soon attains an enviable character—his sales are quick and at enhanced prices—his pride, and it is an honest one, is gratified—and, what he mainly looks at, his income is greatly increased.

The only thing that remains to be noticed in this communication is the varieties of apples that are found to be most profitable for the orchards in this section of New England. Of course, I can speak from my own knowledge of but a very limited extent of territory. And I would observe, especially, that apples that originate in other parts of the country, and have a great reputation there, are not often found to succeed here. The Newtown pippin, the famous apple of New York, is worthless with us. The Swaar, so celebrated in New Jersey, instead of a sound and heavy quality, is light and corky. And so of many other varieties; the change of climate and soil produces a change in their character. Indeed, I much doubt whether the Northern Spy, whose fame has spread like a meteor from the lakes to the Atlantic, and which is now so eagerly sought after by our amateur cultivators, will be found to meet here the extravagant expectations formed respecting it. It has not, that I can learn, as yet been fruited in New England; of course its value is experimental here, and may sadly disappoint thousands who are propagating it.

Our best orchards raise but few varieties of apples, and those few of decided excellence, and well known in the markets. They confine themselves to such as produce well in most seasons, rather than plant those, for the sake of variety, of which only a crop may be obtained once in three or four years. And especially do they endeavor to select those that are found to suit our latitude, which are generally those that are indigenous, but not always, to the soil of New England. Of summer apples, the best and most productive are the early-harvest and early sweet-bough. Of fall apples, the Porter, the fall Harvey, Kilham Hill, the Lyscom, and the Gravenstien. The latter, though of European origin, has attained a very high rank, both on account of the thriftiness of the tree and the excellence and productiveness of its fruit. Of winter apples, the Hubbardston nonsuch, Rhode Island greening, Baldwin, Roxbury russet, and Danvers winter-sweet comprise the chief varieties to which the largest and best orchardists confine themselves. There are many new varieties coming into favor, but the shrewder class of our farmers choose to wait and see, before they run after them.

HAMILTON, MASS., *October* 15, 1849.

ORCHARDS AND FRUITS IN MICHIGAN.

TROY, OAKLAND CO., MICH., *February 5th*, 1850.

The apple trees in this region that have come into bearing were generally natural fruit. These have been engrafted to a considerable extent with the standard varieties, such as the *Rhode Island greening*, *Esopus Spitzenburg*, *Swaar*, *seek-no-further*, &c., which are all good standard varieties. Some have sought for varieties of large size, such as the 20 *oz. pippin*, *pound-sweeting*, *gloria mundi*, &c., which are much inferior in quality. Fruit raised here will compare in quality, if not surpass that of the best fruit-districts in New York. The climate and soil are favorable for peaches, quinces, apricots, nectarines, &c.

The farmers in the first settlement of this country could not obtain cultivated trees, and were obliged to transplant common fruit. This deficiency is supplied now by the establishment of nurseries in different parts of the State, which can supply a large amount of trees of the best varieties of fruit in cultivation in the country. With the *means* of the farmer, increases the desire to improve in the cultivation of fruit. The establishment of horticultural and agricultural societies has served to stimulate the people to consider the importance of improving in fruit culture. The natural advantages for raising fruit are good here. There is a great variety of soil which could be adapted to different varieties and different kinds of fruit, as the knowledge

of their requisite soils is ascertained. There are also advantages of location here. It has been found that fruit is raised every year upon the high ground, and that at an elevation of 15 or 20 feet above the immediate ground around, fruit trees are not affected by frost in spring. So that if a fruit tree was growing upon a mound 15 feet high in an orchard, it would escape a severe frost, while all the remainder of the fruit in the orchard would be destroyed. There are also a great many small lakes in this State, some of them very picturesque, with beautiful sites for dwellings. These waters seem to soften and dispel the effects of frost, so that fruit trees invariably bear abundantly upon their borders. If these locations were improved and properly planted to fruit trees, there is no doubt a large surplus would be produced every year, and the business be made very profitable.

Insects.—The caterpillar and the apple-borer are those which affect the apple trees most here. The first is easily destroyed by attacking the nest when first formed; with a long stick with a crotch in it, the nest can be taken off and crushed with the foot, or if a sponge be dipped in spirits of ammonia and attached to the end of a long pole, and turned around slowly in the nest, every insect coming in contact with it will be killed. The attacks of the borer may be prevented by keeping the bark smooth and washing it every spring with soft soap or weak lye. The most destructive insect we have to contend with here is the *curculio*; for the last five years we have raised no plums, apricots, or nectarines, and the early peaches have been materially injured by them. We have heard of various methods of preventing their ravages, but I am convinced that none will prove effectual but destroying the insect, either in the larvæ or winged state. How far the insect would migrate in one season I cannot say, but that it can fly pretty smartly, there is no doubt. Any person can convince himself of the fact by catching a few of them and placing them upon the open palm of the hand, when they will soon fly away. The experiment is being tried here of planting where hogs run exclusively, and having no other plum trees upon the farm. The disease of the pear tree called *blight*, or *fire-blight*, has prevailed to some extent here, but as far as I have observed, it has been confined to trees that were brought from the State of New York in the early settlement of the country, and to new sprouts taken from the roots of bearing trees, which have been neglected. In Detroit there are seedling pear trees said to be over 100 years old, which bear constantly, and seem to bear very thrifty. I believe they have been free from blight; they are very large trees, some of them 50 or 60 feet high. I have observed a great difference in the flavor of fruit from different trees of the same variety in one orchard, and know not what to attribute it to, unless to the influence of the stock upon the scion. A neighbor of mine, who is a very close observer, took scions of the *Esopus Spitzenburg*, and grafted over a tree which had previously been grafted to some other variety; the fruit from this tree far surpasses any other Spitzenburg he raises in flavor, showing a decided influence of the stock upon the quality of the fruit.

Grapes, Wine, &c.—The Isabella and Catawba grapes are those mostly cultivated here; but they need a southern exposure, or a protection of a wall or tight high fence, to ripen their fruit perfectly. They have not been cultivated for making wine. I have a grape called the *Bradley*, which ripens three or four weeks earlier, is a great bearer, but not as large a grape as the Isabella. It is high colored, and makes a wine similar to Port.

These varieties grow well and bear abundantly; the fruit is not subject to decay in ripening as at Cincinnati. I have made wine from these grapes upon a small scale, and it could be made a good business.

Respectfully yours,

A. C. HUBBARD

Hon. Thomas Ewbank,
Commissioner of Patents.

THE VINE OF NORTH CAROLINA.

Washington, *June 1st*, 1849.

According to my promise in submitting some observations on the fisheries of the United States, and principally those within the waters of my native State, I proceed to offer such information on the products of the vine within that State, as I may possess.

In witnessing the miserable soils on which the vine and the fig flourish, I have been forcibly struck with the proof of maternal kindness of nature in the distribution of her gifts to her children in this nether world, most evident in the growth of the grape. A person navigating the coast of North Carolina and casting his eyes on her sandy beach, her naked hills with an occasional oasis of pine and live oak, would pity the inhabitants that were compelled to dwell on a soil suffering under the curse of sterility, and would naturally infer that it was out of the power and the art of man to draw a subsistence from it. Upon a close examination however, he will find that the grape, the fig, and all the culinary vines, as the pea, the sweet potato, and the melon, flourish in higher perfection, with an equal share of attention, than in the most favored soil. In fact the white grape commonly called the Scuppernong, is the peculiar growth of this sandy region, and all the vines of a similar kind and the growth of a similar soil, are the offspring of this original stock. It is true that the cereals, as Indian corn, wheat, and oats, will not grow in this sandy region, neither will the grape produce in the richer soils of the neighboring counties. Upon a fair balance being struck, in a comparative estimate of the variety, the amount and the value of the products of this sterile and sandy strip of land, with the adjacent islands of Knotts and Roanoke, extending from the Virginia line in Currituck and Princess Anne, to Roanoke inlet, we will find that nature in her impartial administration, has placed it on an equal footing with any given quantity of soil on the main land. In making up the sum of the respective advantages and disadvantages of these two widely different sections, we should add to the sandy district, the wild fowl and fish, in which it abounds, and its salubrity of climate. Nature has designed in this contrariety of soil and production, to introduce exchange and barter between the people of the two regions, and through that medium, trade and social intercourse, which bring in their humanizing train the art of ship-building, and its tributary manufactures. The wisdom and benevolence of nature then are evident in all her works, in the variety as in the abundance of her favors. Our energies, our genius, and our industry, are stimulated and put into healthy activity by that wise decree, that we must earn our livelihood by the sweat of our brows, and it is by thus being compelled by necessity to obtain in a fair exchange through the peaceful channel of commerce,

what others possess, while we have what they want, that our social and political happiness is consummated. If every man produced all he wanted, if all his necessaries, comforts, and luxuries, were within his hands' reach, we should merely vegetate, "like the fat weed that rots on Lethe's wharf."

The white grape finds its most genial soil in the sands of the North and South banks of Currituck county and the Island of Roanoke, three miles from the coast, and lying at the foot of Albemarle sound. Every man's dwelling is ornamented with a wide spread vine, reaching in many cases over an area of a quarter of an acre. Many vines are so large and wide spreading that tradition traces their planting to the first colonists under White and Lane. These vines have grown to over twelve inches in diameter, and their branches extend in all directions as far as it is thought convenient to afford them the requisite scaffolding and props. The posts which uphold the beams and the rafters with the heavy weight of the mass of branches and foliage, are of the pitch pine, and although many have been standing more than a century they are as sound as on the day they were inserted.

The largest vines produce from fifty to one hundred bushels of fruit, which is sold to the wine makers and other consumers at an average of one dollar per bushel. They are the main crop of the bankers and islanders. They grow in clusters of six or eight, generally about the size of an ounce ball or common marble, are of a pale yellow color when ripe, and are the most juicy and luscious of all grapes. They are sweet of flavor, thin skinned, contain a soft pulp that dissolves in the mouth, and generally but few seeds—five or six. The vine grows so luxuriantly, that in the course of two or three seasons the branches run over the bearers or scaffolding, descend to the ground and take root wherever they touch the soil. Joints of these, with the fibrous roots adhering, are the best and safest cuttings for transplanting, and many large vines are thus propagated in districts a hundred miles distant, where they bear well in similar sandy soils. There is one remarkable trait in the growth of this grape that I have observed with much interest. Out of ten seeds sown only one will produce the white grape, the other nine producing the common black or purple fox grape, of very inferior flavor and value to the original white. As soon as the foliage appears a few inches above ground, you may tell by sight which is the genuine white, as it is of a lighter and paler color than its brethren. The black variety will grow in the richer soils of the upper country, but the white will not bear fruit there. The inhabitants of Roanoke and Scuppernong try their hand at making wine in their rude way, but they do much injustice to this excellent fruit, by putting it up just as it runs from the press, without filtration. Much of the pulp and seed are thus intermixed with the juice, and to mend the matter, the wine is not allowed to ferment before they suffocate it by pouring into every barrel of it at least five gallons of new apple brandy. It is of course then nothing more than preserved grape juice, and but little better than new cider, and when taken to market in that state seldom commands over $12 or $15 per barrel. A basket of the grapes will produce with moderate pressing fully three gallons of pure juice.

In 1815 I determined to give this grape a fair trial. I hired a small craft and with two hands went down to Roanoke island, properly prepared with an improved wine press, casks, and baskets. I set up my press in a central part of the island, which is ten miles long, and about four miles wide. I notified the inhabitants that I would give two dollars a bushel for all ripe, clean, hand-picked grapes they would deliver to me. This liberal

price stimulated their activity, and they brought them in as fast as I could press them. The press was lined with cotton bagging or sack cloth, and the platform, raised two feet from the ground, was well calked and pressed together by lateral wedges. The stand-cask into which the wine was first poured contained two layers of filtering material, and the wine came out in a small stream at the bottom perfectly clear. I placed other clean stand-casks of the capacity of 60 gallons each, under a shed convenient to the press, into which I emptied the wine thus obtained. These stand-casks I left uncovered at the top in order to watch the process of fermentation. The wine fermented freely, it being about the 20th of September, and the weather temperate. As soon as I saw the crust at the top begin to break and separate before its precipitation, I racked the wine off at the bottom and put it into clean iron-bound casks. I had previously fumigated the casks with slips of old canvas dipped in melted sulphur, and when the casks were half filled I incorporated the fume of the sulphur and the wine by well shaking the casks, and repeating the motion at intervals till nearly full. I then added a gallon of good old French brandy to the barrel, and bunged it up. This plan stopped the fermentation at the right point, and allowed the wine to settle and mellow before it reached the acetous stage of fermentation. I put up a dozen bottles of the wine when I racked it off while in a state of effervescence, and on opening some a few months afterwards, in the presence of some invited guests, it was highly charged with fixed air, flowed over the glasses in a white foam, and was pronounced fully equal to the celebrated product of France.

We let the wine in the pipes remain untouched till the end of the year, and when broached and tried in the presence of good judges, it proved to possess a rich and superior flavor, of an oily consistency, with a slight smack of honey sweetness. It fully equalled the finest Muscat wine, which it most resembled. We could readily have sold the whole of it at $2.00 per gallon. It would therefore pay well for the trouble and expense of its manufacture, if done "secundum artem." Any capitalist who would enter into the business on a large scale at Roanoke Island, where he can buy the proper kind of land at $2.00 the acre, and who understood the best process of making wine, would find it a more profitable business than farming or grazing on richer lands, and would prove himself a public benefactor.

The white grape is extensively cultivated on the banks of the Scuppernong river, where the soil is light and sandy. It is their principal crop, as the land will not grow corn, and they have to rely upon their wine to lay up their annual store of Indian corn and flour by barter and trade.

In the compendium to the census of 1840, the report for the county of Washington, in which the Scuppernong river is situated, gives only 4.075 gallons. The quantity must be more than doubled since, and the wine improved by a better course of manufacture. If to this we add the product of Currituck, including the north and south banks, and Roanoke Island, we shall be within bounds in estimating the amount at ten thousand gallons.

Cuttings of the White, or Scuppernong grape have been distributed over a large extent of country, and it flourishes on the seaboard of South Carolina and Georgia, and in the neighborhood of Mobile, where it finds a congenial soil and climate. I do not believe it could be cultivated to any advantage north of the 37th degree of latitude, nor at any great distance

from the sea to the south of that.* Its thick foliage and closely intertwined branches afford a cool shelter to the cultivator, and the fig tree grows to a large size around it, and the happy occupant may truly be described as sitting under his own vine and fig tree, with no one to make him afraid.

Before I conclude I beg leave to propound, through the marshal of the district to the leading proprietors of the vineyards in this quarter, which is confined within a narrow circle of not much over 100 miles, the following questions:

How many years since your vine was planted? How old was it when it commenced bearing? How many pounds weight did it produce the 3d and 4th year? How many bushels do you gather in the season, and how many gallons of wine do you make? What is your process of manufacture? What quantity of wine would you judge was produced on the shores of the Scuppernong river? Where do you find the best market for it? Have you improved on the method of 1820 in the making of wine? What is the ruling price of wine when first offered for sale, and does its value increase with age?

ROANOKE ISLAND.

How many gallons do you make, and how much do you estimate is made on the island in any given year? Do you sell any considerable quantity of the grapes at the landing and ports above, and what the average price of the fruit by the quart or bushel? Is there any falling off in the quantity of wine made in your quarter? Is pruning thought necessary, and is it practised to any considerable extent?

All of which is most respectfully submitted by

LEMUEL SAWYER.

Hon. Thomas Ewbank,

Commissioner of Patents.

TRANSPLANTING AND TREATMENT OF GRAPE VINES.

Mount Carmel, Clermont Co., Ohio, *Nov.* 1849.

Dear Sir:—In compliance with your request for information on the Cultivation of the Vine, I will respectfully state that my experience convinces me that a rich, deep, dry soil, is by far the most conducive to the vigorous growth and longevity of the grape vine. The numerous vineyards in various situations in the vicinity of Cincinnati afford good opportunities for observation and comparison. The *Catawba* is the variety chiefly cultivated. I consider the best mode of preparing the ground for a vineyard is to trench it with the spade to the depth of two feet, which costs about $200 per acre: although good preparation is made with a sub-soil plough at much less cost. Strong plants (two years old, if possible) are better for planting than cuttings, as they are more certain to grow, and bear one year sooner. When the vineyard is in bearing, I find it to be good practice to manure well every other year. I apply 20 two-horse loads to the acre, and spade it in 6 inches deep; this covers it better than the plough, and makes it look neater. I prune close in clear dry weather in February, leaving one cane of 10 or 12 eyes to make bearing wood for the next year. I bend down

* Mr. Affleck, of Adams county, Miss., an eminent horticulturist and agricultural writer, states that the Scuppernong is improved by removal to the vicinity of Natchez.

the canes and tie them to the stakes in March, when the buds are fully swollen and near breaking out; by deferring the tying until this time, the breaking of the terminal buds is insured, and the vines remaining free to the agitation of the winds, are less liable to injure from frost and sleet than when tied earlier. I keep the ground clean and loose with the hoe and frequent use of the one-horse harrow, by which means I insure an early and vigorous growth. When the shoots have grown from 10 to 15 inches in length, I tie from 2 to 4 to the stakes, from which I select bearing wood for the following year. I then pinch off all the lateral shoots, as soon as the third leaf is developed beyond the last bunch of grapes. I avoid disturbing the foliage during the time of blooming. When the fruit is well set, I watch it closely: if the weather is showery and mildew appears, it is best to roll the ground with a heavy roller and make it as solid and impervious to rains as possible, and let it remain so all summer. I also make shallow cross drains to lead the water into drains, which are made at every 4 or 6 rows, through which the water passes into one large deep cross drain, at the end of the vineyard. When the foliage becomes injured by frequent showers and scorching sunshine, I allow the laterals to make more foliage than usual, with a view to keep up a healthy circulation in the fruit branches, and also to afford shade and protection to the fruit. I am careful to keep the vines tied to the stakes to prevent the winds from breaking the shoots intended for the next year's bearing, and to give a free circulation to the air, as well as a neat appearance. By this mode of cultivation I saved one-fifth of my crop of grapes the past season, which was an average of more than one hundred gallons per acre. One bushel of bunches of grapes yields nearly four gallons of wine. The past season has been very unfavorable to vine growers, and nearly all vineyards have suffered severely from the rot in the grapes. Much difference of opinion prevails as to the cause of the rot, and some gentlemen of much practical experience now declare that vineyards planted on a dry gravelly subsoil will escape the rot. This has proved to be the case the past season with many vineyards thus planted, but it is not invariably so.

The vine in its native state twines around our forest trees, and flourishes and bears fruit beneath their shade on our cold swampy clay lands. I consider the rot to be caused in some degree by the influence of the atmosphere, the sudden changes from heat to cold, and frequent showers alternately with hot sunshine, which injures the foliage and thereby impairs the circulation of the sap. The rot soon follows, and continues its ravages as long as the weather remains wet and unfavorable. I know of many instances where branches of vines having been accidentally protected from the sun and wet weather, have borne fine, perfect fruit, while other branches of the same vines that were exposed lost nearly all their fruit. I would suggest to amateur cultivators to erect copings of from one to two feet in width over their grape trellises; they will also protect the vines from the late spring frosts and doubtless enable them to grow the *Herbemont*, *Ohio*, and other tender varieties with better success. The coping should be proportional to the height of the trellis; a high trellis will require a broad coping.

Very respectfully yours,

ROBERT NEALE.

Hon. Thomas Ewbank,

Commissioner of Patents.

OATS.

"What varieties have you tried, and with what results, particularly as to time of ripening—what their estimated value as compared with corn as food—is the cultivation of the oat becoming more or less popular, and for what reason?" [*Circular*.

We give below a few only of the many answers received to the questions contained in the circular. We would gladly publish many more extracts on this subject, but want of space prevents.

Mr. D. D. Marsh, of Sullivan Co., N. H., writes as follows: "The cultivation of this crop has been more neglected than any other of its value; and hence has become less popular. Owing to the severe drought during the past season, not more than half a crop has been secured in this section. I consider it an excellent fodder for all kinds of stock when harvested early and fed in the straw. Weight by law, 30 lbs. per bushel."

Mr. Harvey Huntoon, of Unity, N. H., says: "The cultivation of oats is becoming more and more popular from the little labor required. The common kinds succeeds best in this climate. They usually sell at half the price of northern corn, and yield about 40 bushels to the acre."

Mr. Loring Dean, of Manchester, Vt., says: "Common northern oats are principally raised; yield from 20 to 60 bushels per acre; weight, 32 to 35 lbs.; ripen from 10th to 20th August; about one-half the value of corn. The cultivation of oats is becoming more popular, as they are considered very valuable as feed for horses, and a sure crop."

Mr. Samuel Wells, Northampton, Mass., writes: "Common varieties only grow in this section; a good crop, yielding from 30 to 40 bushels per acre; mostly fed to cattle and hogs with corn, and without corn to horses. This is considered our surest crop, but not so profitable as some others."

Mr. Allen W. Dodge, Hamilton, Mass., writes: "The most esteemed varieties are the *Bedford*, the *Kilham*, and such other varieties as are not subject to mildew. Oats are not fed here to cattle or swine, but only to horses. Their value is hardly to be compared with that of corn. Probably less cultivated than formerly in this section."

Mr. John G. Clarke, of South Kingston, R. I., says: "The *white unbearded* oat is the kind mostly grown; weighs 30 to 35 lbs. Another variety, the *black bearded* oat is much raised; also, a kind known as *English* oats, and are highly esteemed by farmers in the vicinity of the sea and bay. The latter require a strong heavy soil, have a large, full grain, and weigh several pounds more to the bushel than the first-mentioned kinds. The crop this year is better than last, although somewhat injured by the drought. We consider one bushel of corn equal to two of oats."

Mr. Myron Adams, of East Bloomfield, Ontario Co., N. Y., writes as follows: "In most parts of western New York oats are a secondary crop in importance, and are merely grown for home consumption. But in some counties, where wheat is not raised, oats are a prominent crop. The varieties cultivated are a mixture of the white and black oats. The yield, under good culture, and on rich lands, varies from 60 to 100 bushels. The best crop which has come under my personal observation yielded 106 bushels per acre. They are generally grown on poor lands and in a slovenly manner, and in such cases produce about 30 bushels. Cost of cultivating oats may be set down at from $6 to $10 per acre.

Mr. J. J. Thomas, of Macedon, Wayne Co., N. Y., says: "This crop is becoming less and less popular among intelligent farmers, as it cannot well be brought into rotation. It is giving way in many instances to the culture of corn. On the other hand, the price of oats has risen of late years, which has induced many to increase their crops. They are estimated at about half the value of corn, as food for animals; 32 lbs. is the standard weight per bushel. The yield in some instances has amounted to 50 or 60 bushels per acre, but last year, on account of dry weather, it did not average more than 25 bushels; price from 30 to 40 cents per bushel."

Mr. Seth Severance, of Oswego Co., N. Y., says: "In this section oats are a very important crop; and their cultivation is increasing, as they find a ready sale at remunerating prices, and may generally be considered a very sure crop. From my experience, I think they should be sown as early as the condition of the ground will admit. By this method they are less liable to suffer from drought and rust, and have a larger growth and plumper berry; value to feed, about three-fifths that of corn."

Mr. S. Turbett, of Port Royal, Juniata Co., Pa., says: "I cultivate only the common white variety; ripens from 20th July to 1st August; yields 40 to 45 bushels per acre; about half the value of corn for feed; becoming less popular on account of exhausting the soil."

Mr. R. L. Colt, of Paterson, N. J., writes that "the climate in New Jersey is too warm and dry to produce good oats—average 40 bushels to the acre, weighing 28 to 32 lbs. per bushel. The variety called the *Potato* oats weighs the heaviest, and produces most of any kind cultivated here."

Mr. W. P. Morgan, of Princess Anne Co., Va., says: "The *Poland* oat has been cultivated for many years in this county. A few years since, Mr. John Tazewell, one of our most scientific and wealthy farmers, introduced the Russian seed, which for a short time did remarkably well, and produced the most prolific crops ever witnessed in this part of the country. It soon, however, deteriorated, and dwindled down to the common oat. This crop is universally considered less profitable and more exhausting to the land than corn or wheat, and farmers raise only sufficient for their own consumption, as a change of feed for horses."

Mr. John Davidson, of Iredell Co., N. C., writes thus: "Good crops of oats can be depended on with more certainty than any other grain in this section. The *ruffled* oat is very much cultivated, and highly esteemed. It is 2 weeks later than the common kinds, and ripens about 15th of July. Oats are used principally as feed for horses, and I think them equal, weight r weight, to corn."

Mr. Daniel Meek, of Knox Co., Tenn., says: "I have tried the *Irish*, the *common*, the *ruffled*, and the *side* oats, and prefer the *common-white*, as they stand up better, and ripen the first week in July, 10 days earlier than any other kind. I consider them better than corn for horses, and from the certainty of the crop and the little labor required, they are becoming more and more popular in this region."

Mr. M. Barnett, of Benton, Ky., writes as follows: "The *black* oats are mostly cultivated here. They yield well, ripen about first of July, and are preferred to corn as food for horses and hogs; the latter will grow faster on oats than on any other raw food, and are frequently turned into

fields of this grain when it is in the milk. The cultivation of this crop is increasing from its certainty, and also from its coming to maturity at a time when other food is scarce."

Mr. Charles F. Ingalls, Lee Centre, Ill., says: "The *black* and *small-white* varieties are the most profitable. The *barley* oat has too heavy a straw, and is liable to fall. My method is to plough the ground in the fall, and to sow *early* in the spring, 3 to 4 bushels per acre. If sown late, oats have a heavy straw, but a light berry."

Mr. Wm. A. Hacker, of Jonesboro', Ill., writes: "There is much difference in opinion among our best farmers as to the relative value of oats and corn as feed for stock. But oats are undoubtedly better for horses. Their culture is becoming more extended from the increase of population and consequent demand. Grain of all descriptions is raised and exported in large quantities from this county."

Mr. J. W. Calvert, of St. Francis Co., Ark., writes as follows: "I have tried three varieties, the *black*, the *white*, and the *ruffled*, and consider them all a sure crop of 20 bushels per acre. I prefer the *ruffled*, as it has a heavier straw, and yields better than the others. The cultivation of this grain is advancing, but not very rapidly, owing to the ravages of the black-bird. I have kept oats 6 years in the sheaf, without injury either to the straw or grain."

David L. White, of Quincy, Florida, writes: "The *white* and *black* varieties both succeed well in this climate. They should be sown in November; the average product is about 12 bushels per acre. This crop is becoming more popular. I prefer cut oats mixed with a little corn-meal to corn and fodder for horses, even in ploughing season."

Mr. Simeon Oliver, of Hernando, Miss., says: "I have grown the *white* and the *ruffled*, but prefer the latter on account of its ripening later (about 1st July), and also for its greater yield. Three bushels of oats are worth two of corn for feed. They are very exhausting to the soil, but the cultivation is increasing as a rotation crop."

Mr. B. W. Hawkins, of Portland, Jay Co., Ind., says: "In this vicinity the *black* oats are preferred; average yield of this variety, 35 bushels per acre, and weight 36 lbs., while other kinds yield less, and rarely weigh over 33 lbs. It is considered a very sure crop, and becoming more popular. Value for feeding, about four-fifths that of corn."

Mr. Perkins, of Burlington, Wis., says: "All varieties of oats succeed well in this climate, and have proved a profitable crop. They are worth from 18 to 25 cents per bushel, and the straw, if well saved, is valuable for wintering young cattle. Compared with corn, oats are considered cheaper food for horses, when cut up and mixed with bran, but dearer if threshed; becoming a more popular crop."

Mr. J. McComb, of Ashland Co., O., writes thus: "I have tried the *large*, and the *small-white* varieties—the latter is most productive; for horses they are better than corn. The crop is becoming less popular, as the market price will not pay for cultivation, unless as a crop to precede wheat. Cost of production, about $3.50 per acre. About half the value of corn for feed."

Mr. E. Clark, of Eaton, Loraine Co., Ohio, writes: "In this vicinity the *English-barley* oat and the common variety are raised. The former lodges badly and shells out in harvesting. Value about one-half that of corn for food, but usually sells for two-thirds the price, and consequently a more profitable crop than corn."

HAY.

"State the comparative value as food for stock, of clover, timothy, and mixed hay—the grass seeds preferred in laying down meadows—the average yield per acre: describe any new process in curing—have meadows been irrigated in your State, and with what effect?" [*Circular.*

Mr. D. D. Marsh, of Croyden, Sullivan Co., N. H., writes as follows:—"The crop of hay this year is scarcely an average one: good lands, well manured, will produce two to three tons per acre; but one ton is as high as the average produce of grass lands throughout this section. In laying down meadows, the seed should be sown thick; a mixture of herds-grass, red-top, and clover is most desirable; as it makes a fine mixed hay, of better quality than either separate. This crop is a very important one, and on land well adapted to its growth, it is very profitable to the farmer: price from $6 to $10 per ton. I have found by experience, that old worn-out grass lands may be made without great expense to produce from two to three tons per acre, by top-dressing with a compost of stable manure and swamp-muck, lime, muriate of soda, (common salt,) and nitrate of soda being used in its preparation. This I have found a highly valuable manure for grass lands, and many other crops."

Mr. Isaac Hubbard, of Claremont, N. H., writes thus: "Hay is our staple crop. Almost every kind of grass is more or less grown. For laying down meadows I use herds-grass, Northern clover, and red-top, mixed. Clover is good for sheep and milch cows, and to turn under as a fertilizer. But one ton of mixed hay is worth one and a half tons of clover for horses, and costs much less to cut. A gang of from 4 to 6 men, with good tools and team, in favorable weather, will cut and secure a ton each per day. Price of labor in haying time, $1.00 to $1.25 per day, with board. Yield of mixed hay, from 1 to 1½ tons to the acre."

Mr. Samuel Wells, of Northampton, Mass., writes as follows: "The business of many of our farmers being the stall-feeding of cattle, great quantities of hay are grown on our alluvial meadows, and it is usually of mixed grass. The most common is timothy or herds-grass, mixed with clover and red-top. A large portion of our meadows where grass is grown is subject to an annual inundation, which leaves a rich deposit on the land. Red-top is considered the best grass, timothy next, and clover is rarely grown without mixture. Meadows, on being laid down to grass, yield the first year 1 to 3 tons, and afterwards 1 to 2 tons per acre. Lately some of our best farmers have sown grass seed among corn at the last hoeing, taking care not to hill up the corn, and have been very successful in that practice."

Mr. Allen W. Dodge writes from Hamilton, Mass., as follows: "In laying down lands to grass, we use of timothy 1 peck, red-top 1 bushel, and a sprinkling of clover. Clover is considered best for milch cows, timothy for horses, and red-top or mixed hay for other stock. Salt or marsh hay is used here in large quantities for cattle. Average produce, about 1 ton per acre."

Mr. L. Smith, President of "Sullivan County (N. Y.) Agricultural Society," writes as follows: "Both clover and timothy are raised in this section, sometimes separately, and sometimes mixed. In the latter case the

large kind of clover is preferred, as it is hardier and grows larger than the common June clover, and also because it ripens at the same time with the timothy. The seed of the *large kind* is worth $\frac{1}{4}$ to $\frac{1}{3}$ more than the small. I believe that the value of clover is generally underrated, compared with timothy; I mean clover of fine growth, cut at the proper stage, and cured in small cocks, without being spread to the sun to dry. From my own experience, I am convinced that, when cured as above, it contains more nutriment than timothy. A few years ago I had an opportunity, without design on my part, to test the relative value of each as feed for cows. I filled a part of my barn with clover hay, and fed seven cows on it all winter. In another part of the barn I kept six cows on the best quality of timothy hay. The cows were all alike, and were fed and tended by the same man. In spring those kept on clover were in so much better condition than the others, that every one who saw them remarked the difference. Clover is also much more valuable as a fertilizer; having long tap roots which penetrate deep into the soil and bring up the fertilizing elements to the surface; and when the roots decay, they form a rich mixture of vegetable matter, which renders the soil light and porous. The roots of the timothy, on the contrary, skim along the surface, and the soil beneath becomes hard, impervious to the air and water, and consequently unproductive."

Mr. J. H. Merreck, of Delaware county, N. Y., says: "I consider timothy most nutritious for cattle; but for all kinds of stock, a mixture of clover and timothy is preferable. The nature of the soil should determine the proportion of each. On wet lands little or no clover should be used; on drier soils the proportion of clover should be increased, until we come to the driest sand and gravel, when little grass of any kind can be relied on. Irrigation, when practicable, is of great value; and often doubles the crop."

Mr. J. M. Nesbit, of Union county, Pa., writes: "Clover is considered best for horned cattle of all ages and descriptions; but for working horses, timothy, or a mixture of timothy and clover, is preferred. The former is principally used in laying down meadows, unless the land is very wet and cannot be easily drained; when thus situated, a portion of red-top seed is frequently sown with the timothy."

Mr. Henry B. Jones, of Brownsburg, Va., writes thus: "Any person can make good hay in fine weather, and the process is very simple. But in showery seasons the work is difficult, and requires good management. Clover hay should never be scattered if the weather is fine, but merely the swarth turned over, and when well wilted it should be put in slim tall cocks for a day or two, and then it should go to the shed or mow, with about 1 gallon of salt sprinkled over each ton. Timothy hay is also best when it can be cured without too much exposure to the sun; but as it turns rain much better than clover, it should season a week or ten days in the cock before being ricked or put in large stacks. It should also be perfectly dry, otherwise it becomes mouldy, and is not relished by any kind of stock. Clover and timothy are often mixed in sowing, but the timothy being later in ripening, I am of opinion that some loss is sustained. I think orchard grass mixed with clover is much better, as both ripen about the same time; and the orchard grass having a stiff straw will keep the clover from falling. I have sown in the spring and fall. Fall sowing is preferred by some, if it can be done early, say from 1st to 15th September. I take $1\frac{1}{2}$ bushels

orchard grass and 4 quarts clover seed, make the seed wet, and then work it over with plaster, lime, or ashes, until it is so dry that the seed will not stick together; it is then fit for sowing, and this quantity of seed will sow one acre. This hay I have found very excellent for milch cows and cattle. As our valley abounds in many places with fine streams of water and good springs, irrigation is generally practicable, and is found to add much to the product of grass lands. The water is taken out as near level as can be, and little gutters are cut from the main ditch, 6, 8, and 10 paces apart, which are again forked so as to throw the water all over the grass. Where the water is plenty, and the hill-side of good breadth, parallel ditches are cut, from which the water is again distributed by gutters so arranged as to spread it as evenly over the ground as possible. Where the meadows are extensive, a hand should be kept constantly employed in changing the direction of the water. The lower part of the meadow should be watered first in the season, while the water is abundant; and as the stream grows weaker, work up to the higher grounds."

Dr. Samuel D. Martin, of Clarke county, Ky., writes as follows: "Clover is extensively sown for increasing the fertility of our worn-out lands, and also as food for stock. Land that has been cultivated many years, until its productiveness has greatly diminished, will be restored in a few years by clover, which at the same time affords nearly as much grazing as any other kind of grass."

Mr. Ralph Ware, of Granville, Putnam county, Ill., writes thus: "Timothy hay is generally preferred, but in seeding we use a mixture of timothy, clover, and red-top. Average yield, $1\frac{1}{2}$ tons per acre. The cultivation of grass is rapidly increasing, as the wild grass cannot be relied upon, for two reasons: 1st, It is very late in spring, and fails early in the fall; 2d, The open prairies are being fenced up to such an extent that it is quite too far for cattle to go daily for pasture and return at night."

Mr. Charles F. Ingalls, Lee Centre, Ill., writes as follows: "Mix timothy and clover for dry soils, timothy and red-top for wet lands. We allow the hay to lie in the swarth until partially cured, and then put it in cocks, when the prairie winds will cure it first rate. Average yield, $1\frac{1}{2}$ tons per acre."

Mr. N. D. Smith writes from Washington, Ark., as follows: "All the varieties of meadow grasses that are so much esteemed in a more northern latitude, have nearly failed here by reason of the long-continued droughts and the heat of our summers. To obtain a grass suited to our wants has long been a desideratum, and I believe from an experience of seven years that it has at last been discovered. This is the *Guinea grass*. It is a native of Africa, and was first imported into the island of Jamaica by the governor, as a bird seed. It was there propagated, and has become a very important article of provender and pasture for every kind of stock, considered only second in value to the sugar cane. It was introduced two years ago into Louisiana, where it is highly valued for soiling and for hay. On rich dry ground it grows to the height of 8 feet, and may be cut 4 feet high four times in a season, yielding two tons per acre at each cutting. I consider it equal to the best cured corn-blades of equal weight. It is best propagated by the roots, which resemble those of the *calamus*—each joint sending up a tuft of blades. The roots extend deep and wide, occupying all the ground as deep as the soil is loosened, and are equal to artichokes as food for hogs. This grass is figured and described in Loudon's Cyclopedia of Agriculture."

DOMESTIC ANIMALS.

"*Horses and Mules.*—Number raised in your State—average value of each—comparative value for farming purposes—where is your market for them?"

"Number of *Horned Cattle* in your State—average value, at 3 years old—where driven to market—cost of keep per head per year—which of the improved races preferred?"

"*Hogs.*—Average weight at a given age—average weight consumed per head—proportion of live to net weight, and cost of production per pound." [*Circular.*

THE statements received from our correspondents on the above subjects, are of too vague a character to form the bases of any correct estimates, as to the number of horses, cattle, &c., in the United States. The census of 1850 will furnish much accurate and reliable information on this head, which will be looked for with interest by farmers and others, in all parts of the country.

We give a few extracts, however, principally of a practical character.

Mr. Drisko, of Jonesboro', Me., says: "Not so much attention is given to stock now as was some years since. Enough is raised, however, for domestic purposes, which prevents importation from the western counties to so great an extent as formerly. Five years ago, large droves of working oxen, principally for lumbering, found a market in this county. Considerable numbers are now driven to Brighton, from the central counties of the State, yielding fair profits. Price of working oxen in this vicinity, from $50 to $100 a pair. Cows, $20 to $30 each. Average price of beef, $4.00 per cwt."

Mr. Bradley G. Child, of Bath, N. H., sends us an account of a remarkable cow, raised by him, of the native breed. He says: "In the summer of 1844, she calved about the first of June—during that month, and extending into July, she gave at night-milking 24 quarts of strained milk, and in the morning 18 quarts—making 42 quarts per day from 2 milkings. This cow was of medium size, light brindle color, and was 7 years old. She had no extra feed in summer, but was kept in a good pasture, and in winter had nothing more than the usual foddering of hay. She was farrow the season of 1843, and was accidentally injured early in the year 1845—so that she was ruined as a milker, and was then fattened and killed." Mr. Child still retains the same breed of cows.

Mr. Isaac Hubbard, of Claremont, N. H., writes: "Cattle are extensively raised here—perhaps, nowhere are they better than on the Connecticut river. Average value at 3 years old, $25 to $30. They are usually sold the following summer or fall, and driven to Brighton market. We have the Durhams, Ayrshires, Devons, and several other foreign breeds—of these the Durhams are usually most esteemed. Many of the native cows are good milkers. A cross of the Durham with the native breeds raises good working cattle, perhaps the best for all purposes. The Ayrshires have been lately introduced, and are highly recommended as milkers. The Devons are small, sprightly, and active, make good working-cattle and fine beef. They are preferred by many on account of their color, a bright red.

"At 20 months old, hogs will average 400 lbs. net weight. We can raise 20 cwt. of pork from 5 hogs, as easy as the same weight of beef from 2 oxen."

Mr. Marsh, of Sullivan Co., N. H., says: "The increase in number and value of neat cattle has been very great within a few years—and there is a commendable zeal for the improvement of stock, among our farmers. The native cattle, rough, and often unsaleable, are fast giving away to improved breeds, among which, the Devons are highly esteemed. As working cattle they are unsurpassed, and from their uniformity of color and build, are easily matched. They are active, docile, and tractable, as well as tough and hardy, and will perform much hard labor without losing flesh. As milkers, they are similar to our native cows, but the quality of their milk is always rich. On this point, Mr. Allen, author of 'Domestic Animals,' published in 1848, remarks: 'The cows invariably yield milk of great richness, and when appropriately bred, none surpass them for the quantity of butter and cheese it yields.' The color of the pure Devons is always red. Average value of native cattle, 3 years old, $28—improved breeds, much higher."

Mr. Dean, of Manchester, Vt., says: "The breed of cattle most approved here is the Durham. Value at 3 years old, ranges from $25 to $40. Cost of keeping, the first year, about $5; second year, $7; third year, $9. Brighton is our chief market."

Mr. Allen W. Dodge writes from Hamilton, Mass., as follows: "Average value of 3 year old cattle, $20. None are raised here for sale, but our farmers purchase a great part of their cattle from droves raised in Vermont, New Hampshire, and Maine. There is much difference of opinion as to which of the imported breeds preference should be given. The native breeds are those usually found on our farms. Durhams are better for oxen than for cows. They are large, strong, and quick for draught, but too large for cows. The Ayrshires have a good reputation, but are rarely to be met with; more rarely than the Durhams."

Mr. Aaron Bagg, of West Springfield, Mass., says: "The average weight of hogs, at 18 months old, is about 300 lbs. Difference between live and net weight, 25 per cent. Cost of production, 6 cents per pound. I do not think it profitable for our farmers to make pork at the present high price of corn."

Mr. Thomas, of Wayne Co., N. Y., writes: "Horses are mostly used for farming purposes; mules to a limited extent. But the impression is greatly in favor of the latter, from their hardiness and strength. But few of the best horses are sold in the country, being mostly sent to the Southern and Eastern cities, at an average of about $150 each—average value of farm horses about $80.

"Value of cattle at three years old, from $20 to $30—sometimes, as high as $50. About one-third are slaughtered at home; the remainder are driven to the Southern and Eastern counties to be fattened. The cost of keeping per year is not less than $15. The best selected native stock are usually preferred. Some very fine animals have been obtained by a cross of these with the Durham.

"The production of pork is not generally profitable to farmers. A few, however, who use largely their refuse apples for this purpose, (which they cook with their smallest or unmarketable potatoes and a little corn-meal,) make the raising of hogs quite profitable."

Mr. Samuel Linn, Jun., of Highland county, Ohio, gives the following statement of an experiment made to ascertain the value of corn in fattening

hogs: "A lot of fifty-eight hogs (a mixture of Berkshire and other breeds) were taken for the experiment. Their average age when the fattening commenced was fifteen months, up to which time the cost of raising was as follows:—For the first five months, their food being chiefly corn fed to them and the sows, 10 cents a month per head, making 50 cents: average weight at five months, 60 pounds. This brings them up to the first of November. For the six succeeding months, I found that about three pecks of corn per month to each was necessary to keep them in thriving condition, which, with the labor of feeding, care, &c., was worth 20 cents, making $1.20. For the next four months they were kept on clover, gleanings of stubble, apples, &c., at a cost of 10 cents a month per head, making 40 cents.—Cost of raising up to this time, (September 4th,) when fattening commenced, $2.10 a head. The fifty-eight head now weighed 8120 lbs.; average, 140 lbs. each. Fattening now commenced, and was continued over three months, during which time they consumed 850 bushels of corn, of which 500 bushels were 'hogged down,' as we term it; that is, fenced off in lots, as they needed it, of from one to two acres, and the hogs turned in. Corn on the stalk is worth 15 cents per bushel: an additional cent for labor of fencing makes the 500 bushels worth $80. The 350 bushels fed by hand, with the labor of feeding, worth 20 cents per bushel, amount to $70. Total cost of fattening, $150, or $2.58 per head. Add cost of raising, $2.10, and we have $4.68 as the total cost per head for rearing and fattening. At this time (December 11th) their average weight was 300½ lbs.

"From the above we may derive the following answers to your inquiries:

"*Average weight at a given age.*—At five months old, 60 pounds: at eleven months, 100 pounds: at fifteen months, 140 pounds: at eighteen months, when fat, 300 pounds. Average weight of corn consumed per head, 822 pounds.

"*Proportion of live to net weight.*—The prevailing custom here, is to deduct one-fifth. But on a good breed of hogs, fattened as above, repeated experiments have convinced me that this is too much. A hog killed last season weighed alive 242 pounds, and when dressed, 202 pounds; the loss being about one-sixth, which, I think, is about the true estimate.

"*Cost of production.*—From $1.50 to $1.80 per cwt. The average price for fifteen years past, about $3.40."

Mr. Barnett, of Benton, Marshall Co., Ky., writes: "Good milch cows sell here at $8 to $10, and fat beef, on foot, at $2 per cwt. They are mostly shipped to New Orleans. Some improved Durhams have been tried, but with little success. The cross with the Durham preferred to full blood. Our scrub breed of cattle, *having more industry*, do better on our wild grass. Average weight of hogs at eighteen months old, from 150 to 200 pounds. They make their living in the woods, and are frequently killed fat from the mast. Raising hogs is profitable here. Pork is worth $2 to $3 per cwt.; bacon, $4 to $6."

Mr. Geo. McKenney, of Lincoln Co., Ky., says: "The number of horses in the State, in 1848, 361,828; value, $10,743,492. Mules, 37,426; value, $1,318,779. Average value of horses, $29.69; of mules, $35.31. Horses are generally more valuable than mules for farm purposes. From the fact that the soil of Kentucky is very deep, rich, and tenacious, mules are too light: while horses are heavier and stronger, and though more subject to disease, are preferable. Number of cattle in this state, 459,026; value, $1,779,634; average value from three to four years old, $15 to $20; when fat, $25 to $35; cost of grazing, 40 to 50 cents per head. Short-horn Durhams are generally preferred in this section."

Dr. Samuel D. Martin, of Clarke co., Ky., says: "This State has a great variety of land, and as each breed should be adapted to the soil, no one kind will suit every locality. On the richer lands the improved short-horns are preferred. I sold my three-year-old steers last year for $47 each; this year, for $40 each. They were short-horns, and had been corn-fed one winter. Cost of keeping, about $6 a year when wintered on fodder, and from $15 to $20 when wintered on corn. Hogs are usually killed at eighteen months old; average weight, 300 pounds."

Mr. Henry B. Jones, of Brownsburg, Va., writes as follows: "Pork raised on grass and corn costs here from $4 to $5 per cwt. Eighteen hogs, killed on the 1st of November, each 16 months old, averaged 197 lbs. From another lot of 14 hogs, 4 were taken out, and fed well on shorts, corn, and kitchen slops, and at 11 months averaged 285 lbs. each. The remainder ran out, and were fed twice a day. At the same age, they averaged only 60 lbs. This shows the difference between good and bad keeping. For family bacon, I think hogs of from 160 to 200 lbs. are best, which run out, but are well fed."

Mr. C. Zeringue, of Jefferson Parish, La., says: "Cattle 3 years old are valued here at $7 to $8 per head. They are raised at very little cost, the only trouble being to drive them together once a year, and mark the calves. We then separate those to be sent to New Orleans, our only market. There has been no improvement in the race from the long-horned cattle, originally imported by the Spaniards."

Dr. White, of Quincy, Fla., writes: "Value of cattle 3 years old, about $6. The only expense of keeping is to ride into the range and mark and brand them in spring. But few hogs are raised. We find it cheaper to buy our meat in New Orleans than to raise it, owing to the depredations of the slaves."

Mr. Ralph Ware, of Putnam Co., Illinois, says: "Market for cattle at Chicago; thence many are driven East, or shipped down the lake. We prefer the Durham in this section. Large numbers of horses are raised, and find a ready market at home—average value, $65; but few mules are used. Average weight of hogs, at 18 months old, 250 lbs.; consumed 25 bushels of corn; pork worth from $2.25 to $2.50 per cwt. Much pork raised at a loss to farmers."

Mr. B. W. Hawkins, of Portland, Indiana, says: "There are about 180,000 horses in eastern Indiana; average value, $60; our market in Cincinnati and the Eastern cities. Hogs at 2 years old average 200 lbs.; cost of production, $2.50 per cwt. I am now feeding one on boiled corn, between two and three years old, supposed to weigh 600 lbs."

THE SCIOTO IMPORTATIONS OF IMPROVED CATTLE.

We are indebted to the Hon. J. L. Taylor, of Chillicothe, Ohio, for the following engraving and description of one of the best cows of the short-horn breed ever introduced into this country. The importations of short-horned cattle by the Ohio Company, and others, have effected a rapid improvement in the breeds and quality of the cattle of the Scioto valley,

and great benefit has resulted from their importation and sales, to that section of the country. Due honor should be awarded to the enterprising capitalists through whose agency these results have been accomplished.

"The Scioto Valley has become somewhat famous for the production of fine stock. From 25,000 to 30,000 head of the best fatted cattle annually driven to the Eastern markets, are taken from this valley, south of the National road. This great business, implicating the value of a million and a quarter of dollars, was commenced by the late Felix Renick, Esq., who was then a recent emigrant from Hardy Co., Va. He and his brother George, in experimenting upon the virgin soils of this luxuriant region, then almost a wilderness, found that immensely large crops of Indian corn could be raised with but little labor, but that there was no remunerating market for large crops of this staple within reach. They devised the project, thus for the first time conceived in this country, of fattening large herds of cattle with their luxuriant crops of maize, and *marching* their grain to distant marts in the shape of fat beef.

"What the trade has become, is known to most of our readers. For a large portion of the year, the Eastern cities as far north as New York, inclusive, are supplied with beef from cattle fattened on the Indian corn of the West and South-West, after the practice commenced in this neighborhood, nearly fifty years ago, by the Messrs. Renick. Nor was the agricultural enterprise of these gentlemen and their compeers confined to this feature of stock improvement. In the year 1833, several of the principal farmers of Ross and two or three adjoining counties, formed an association whose object is sufficiently explained by its title, viz.: 'The Ohio Company for Importing English Cattle.' This society commissioned F. Renick, Esq., as their oldest member and worthy representative, to proceed to England, and, after devoting as much time as he might deem necessary for his purpose, to an examination into the several qualities and descriptions of neat cattle in the best agricultural districts of Britain, to select and purchase, with less regard to cost than to their intrinsic and prospective value, a sufficient number of cows and bulls requisite fairly to introduce their breed into this neighborhood. This mission was highly successful. Mr. Renick was received with great kindness and marked politeness by the principal breeders in the best grazing districts of England, who afforded him every facility for accomplishing his object. He returned, in due time, with some score of animals, of both sexes, of the celebrated Durham short-horn stock, most of which lived and were good breeders. These were held by the various members of the company for a few years, and were then disposed of, at public auction, chiefly to the persons directly interested, at prices greatly above the original cost—so well had public opinion sustained the judgment of the company's agent, Mr. Renick. We recollect that one cow with a young calf was knocked off at the round sum of $2250, to one of the best farmers of Pike county, (who, we are sorry to add, was so unfortunate, soon after, as to lose them both by death.)

"The short-horn stock has become widely disseminated throughout this State, in all the 'grazing' and 'feeding' regions, especially. The *beef qualities* of the species are pre-eminent. Crossed with 'the Patton' or with common stock, good milkers are always the produce; while frequently the thorough-breds yield large quantities of milk. Owing to their rapid procreation, the prices of the short-horns are, of course, much reduced—as was expected and intended—so that the farmer of one hundred, as well as the

SHORT-HORN COW "VIOLET,"

THE PROPERTY OF GEORGE RENICK, ESQ., CHILLICOTHE, OHIO.

owner of a thousand acres, may have his herd. But, the great gain is found in the increased average weight of the fatted cattle driven from this neighborhood, which is not less than 100 lbs. a head above that which prevailed 20 years ago.

"Above is a portrait of one of the best and handsomest cows of the short-horn breed, ever introduced into this neighborhood. Her pedigree is thus noted on page 681 of vol. iii. Coates's Herd Book:—

"'*Violet*, Roan, calved Nov. 30, 1831—Bred by Mr. Smith, of Drax Abbey, the property of Mr. George Renick, Ohio, U. S. America; got by Sheridan, (2616) d. (Fortune) by Regent, (2514) g. d. by Reform, (1361) gr. g. d. (the Old Red Cow) by a Bull of the late Sir George Strickland's, gr. gr. g. d. by Northumberland, (466) gr. gr. gr. g. d. by Mr. Booth's Son of the Twin—brother to Ben, (88.)'

"*Violet* was imported from England, by Mr. George Renick, of Ross County, Ohio, in 1836, and a premium of $50, (in a Silver Pitcher,) was awarded to him, for this Cow, at an exhibition of all the finest stock imported by 'The Ohio Company for Importing English Cattle,' as the best Cow imported by them. The original cost Mr. Renick does not recollect; but he informs us that he could have sold Violet, at one time, for the sum of $3000."—*Scioto Gazette.*

LIME, PLASTER, AND OTHER FERTILIZERS.

The judicious application of manures to land, involving as it does the *feeding of plants*, is a matter of the greatest practical importance to the cultivator of the soil. On no subject is there more difference of opinion among farmers, than as to the benefits to be derived from the use of lime as a fertilizer. These opinions are based on individual experience; and so far as that particular locality on which the experiment was made is concerned, the results and inferences derived therefrom are usually correct. For instance, one farmer applies 20 bushels of lime to an acre, and the result is that his crop is nearly doubled. Another man, in the same neighborhood perhaps, makes a similar application, and finds the produce of his field not at all increased. Now the failure in the latter case arose solely from the fact, that the nature of the soil was not understood, and other elements than lime were wanting in its composition. It requires a very close study of the nature of soils, and of the rocks on which they rest, as well as of the elements of the plants to be grown upon them, to enable the intelligent farmer to apply such fertilizers as will best promote the growth of healthy and vigorous crops. These preliminary remarks are necessary to explain the cause of the somewhat conflicting statements which will be found in the following extracts.

Mr. S. Hale, of Keene, N. H., says: "Plaster is used very generally on the Connecticut river meadows in this county with good effect. It is supposed to exhaust the land by increasing the crop. Land thus exhausted can be restored by the use of ashes. In other parts of the county, except in particular localities, it has not been found beneficial. In Keene, which is situated in a valley, once the site of a lake, it has been often tried without benefit. The soil is sandy, formed by the disintegration of the rocks on the surrounding hills. Some of these contain *sulphate of iron*, most of them a greater or less proportion of lime.

"I have used guano twice, as a manure for corn; at each time on an eighth of an acre, at the rate of 300 pounds to the acre. The soil was sandy, light, and dry. The land being ploughed and harrowed, the guano was first pounded, then sifted with a riddle or coarse sieve. It was then intimately mixed, a portion at a time, with five times its own weight of soil, and sown broadcast over the field, which was immediately harrowed, rolled, and planted. At both times rain followed soon after the application. On this part of the field no other manure was used. But on another, adjacent and similar, manure was spread at the rate of fifteen cart-loads to the acre. The crop was better on the piece manured with guano than on the other. I have often used ashes as a fertilizer, and always, no matter what the soil, with good effect."

Mr. Huntoon, of Unity, N. H., says: "Bommer's method is coming much into use here, and I consider it a valuable acquisition. I use bone-dust in preference to plaster. Lime on our soil is not of much value; wood ashes are far better."

Mr. Dean, of Manchester, Vt., writes: "Plaster, ashes, and lime are the best fertilizers for our lands. Plaster is worth $10 per ton; ashes and lime, 16 cents per bushel. Twenty bushels of the latter applied once in 3 years is my method."

Mr. Wells writes from Northampton, Mass.: "Plaster is used here to some extent on warm lands, and would be much more used were it not for the expense, as it costs $9 to $10 per ton. Bone-dust has lately been introduced, and has proved very beneficial, although the quantity as yet used is small. If lime could be had at a price which would justify its use, it would add much to the products of our lands."

Mr. Wm. Lapham, of Mt. Tabor, Champaign Co., Ohio, writes as follows: "We have used plaster and clover as a preparation for wheat, and have found great benefit from them. Our soil is a sandy loam, with a sub-soil of clay, resting on a substratum of gravel. Portions of it have been in cultivation for 20 and 30 years. The plaster is obtained from Lake Erie by railroad, and costs when delivered here four dollars per bbl. of 400 pounds, or one dollar per hundred, ground and ready for use. Our method of using these fertilizers is to sow the plaster at the rate of one bushel per acre on the young clover in the spring. In the second or third year the fall crop of clover is ploughed under, and the wheat sown immediately. The clover is sometimes sown in the spring on the growing wheat, and harrowed in; but we succeed best in sowing the clover with oats. The direct effect of the plaster upon the clover is very great, and the benefit to the succeeding wheat crop is also very apparent. The general influence of plaster and clover has been to permanently increase the fertility of our soils."

Mr. John Kuhn, of Ashland Co., Ohio, says: "The soil here is a heavy clay, and, so far as my experience extends, the application of lime and plaster to this land is money and labor thrown away. But all kinds of animal and vegetable matter, and ashes leached and unleached, are highly beneficial to grains, grasses, and root crops."

Mr. J. M. Nesbit, of Lewisburg, Union Co., Pa., gives the following as the result of his experience on this subject: "During the last few years lime has been used in large quantities in this part of Pennsylvania, and I believe the effect has been uniformly beneficial on all soils. The quantity applied per acre varies from 50 to 100 bushels; depending upon the circumstances of the farmer, the convenience of procuring it, and the nature of the soil. I have not observed, from my own experience, much difference in the immediate effect of the lime, whether applied in large or small quantities; but it is fair to presume, that if the quantity be large, a repetition will not so soon be necessary on the same ground. In 1840 the cost of lime at the kiln was 10 cents per bushel. Now it can be had in any quantity for 6 cents, and in some cases for 5 cents. The cause of the reduction in price is, that formerly wood alone was used as fuel for burning it—now it is burned with the screenings, or waste coal, from the mines; thus greatly economizing the cost of the lime, and also affording a fair price to the miner for that which would otherwise be valueless to him. I should here observe, that since we have commenced the application of lime to our lands we have ceased the use of plaster. After a number of experiments, we are satisfied that the effect of plaster is completely *neutralized* by the lime previously applied to the same soil. How long this result will take place after the lime has been applied to the soil, our experience is of too limited a character to determine; but we have observed the same effect after a lapse of five years. We shall continue our experiments, in order to determine whether it will hereafter become expedient to apply lime and plaster to the same soil; or

whether the lime will combine with the acid in the soil and form a sufficiency of *sulphate of lime* to obviate the necessity of any direct application of it to the growing crop."

Mr. Morgan, of Kempsville, Va., says: "The opinions in regard to the quantity of lime that can with safety and profit be applied per acre, are various, ranging from 50 to 500 bushels. The judicious application of this great renovator must of course be regulated by the chemical composition of the soil."

Mr. Henry B. Jones, of Brownsburg, writes: "Plaster is very much used in the valley of Virginia. No good farmer will do without it for his clover crop. It is generally used mixed with an equal quantity of ashes. Lime is also beginning to be used, and from 50 to 100 bushels per acre are applied with great success on wheat lands."

Mr. Ruff, of Xenia, Ohio, writes thus of the effects of lime and plaster: "I used plaster the present year for the first time on clover, and find that it has doubled the yield. On corn its action is not so great: nor are its effects so apparent on any other grass as on clover. If it were cheap, it would doubtless add much to the fertility of our soils, and to the agricultural prosperity of this section of the country. I have used lime for a number of years, by way of experiment, in both large and small quantities, and have found it to be entirely worthless—its effects being merely perceptible the first year, and not at all afterwards. The results of experiments in other parts of the State are reported different."

APPLICATION OF LIME.

North Whitehall, Lehigh Co., Pa., *Nov. 22d*, 1849.

Sir:—In your circular of July, 1849, you say—"Whatever may have been tested and found useful and new in practice, together with important agricultural statistics, will be acceptable." If the following will be deemed sufficiently important to be accepted, I shall feel myself happy in having contributed to such an interesting and valuable document as the Patent Office Report.

Twenty-five and thirty years ago, the best and most economical mode of applying lime to arable land as a manure was in a caustic state, fresh from the kiln; but after two or three applications its effect gradually diminished, until of late it has frequently been, the first season after the application was made, more injurious than beneficial.

The reason is obvious: at the first application the soil was full of sour insoluble humus, the soluble having been exhausted by frequent cropping.

Chemistry tells us that caustic lime acts chemically on the humus, by accelerating its decomposition and rendering it soluble, and thus fit to enter the minute fibres of the roots of plants; moreover, it deprives sour humus of its acidity and renders it fertilizing; therefore the richer the soil is in humus, the more sensible is its action: therefore the diminished effect of lime is in proportion to its repeated applications.

An improved soil (if we may call a soil improved which is freed from briers, thistles, and other noxious weeds) requires that lime should be improved as well as other manures before its application, in order that it may partake more of the character of an aliment, instead of a stimulant as it is in its caustic state. This improvement is effected by throwing the lime into heaps of 20 or 30 bushels, or more, and so leaving it for two, three, or four months, according to season; say in summer for two months, in winter from four to five. By this time the lime is decomposed, and becomes a mild carbonate, and ready to furnish the plants with actual nutritive matter, as well as furnishing a medium through which the roots of plants obtain carbonic acid, which it immediately reabsorbs in equal proportions from the atmosphere.*

In order to show the foregoing not to be a mere hypothesis, I will give the result of actual experiments and observations made by myself.

In the month of August, 1846, I limed a portion of a fallow field, of a thin gravelly soil, resting upon a roofing slate rock, which had been limed several times before at intervals of from five to six years, but no other manure applied. The lime was drawn fresh from the kiln, and deposited in small heaps of half a bushel each, seven paces by eight asunder. The weather was warm, the lime soon became pulverized without the aid of water, and was then immediately spread and harrowed in. Early in the month of September following the whole field was sown with rye. At harvest there was not the least perceptible difference in grain or straw, in the yield of the limed and unlimed portions of the field. In 1848, the same field was again down with rye, but at the last harvest there was a marked difference perceptible, both in grain and straw, in favor of the limed portion of the field.

In the month of June, 1847, I limed an adjoining field of similar soil, and under similar treatment. The lime was deposited in heaps of from 20 to 30 bushels each. In the latter part of August following, the lime was spread at the rate of about 35 bushels per acre and immediately harrowed in, and, in a week or two after, the field was sown with rye, which yielded at the following harvest the heaviest crop the field ever produced.

In the fall of 1848, a neighbor of mine hauled a quantity of lime on a meadow of a dry gravelly soil, in heaps of about 20 or 30 bushels each; last spring the lime was spread, but at what rate per acre, I am unable to say. Judging it, however, at between 50 and 60 bushels per acre, the yield was about one-third more grass than usual. The same neighbor applied lime last season, thus prepared, to his corn crop growing on a limestone soil, and with marked success.

Very respectfully, your obedient servant,

EDWARD KOHLER.

Hon. Thomas Ewbank,
Commissioner of Patents.

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* Our correspondent is wrong in supposing that plants extract carbonic acid from the carbonate of that mineral. The carbonate of lime is dissolved in rain-water more or less charged with carbonic acid, and both the base and acid enter into the circulation of plants.

After slaked lime is spread on a field, it very soon imbibes carbonic acid, and becomes a mild carbonate.

CHARCOAL AND WATER.

About one-half of the dry weight of all plants is *carbon*, or *charcoal*. Of the other moiety, more than four-fifths are water, or, more correctly, the elements of water, called *oxygen* and *hydrogen*. Without the presence of moisture, both in the soil and the atmosphere above it, no plant can grow; and the presence of carbon, in a dissolved or gaseous form, is equally indispensable to the production of all vegetables.

It matters little whether carbon is accumulated in a solid form by imperfect combustion, as in the making of charcoal from wood in a common coal-pit, or by the slow decay of plants (*eremacausis* of Liebig) in forming mould, muck, and peat. The power of these carbonaceous and exceedingly porous bodies to condense the gaseous food of cultivated plants should be universally known. De Saussure found, by direct experiment, that the charcoal formed from box-wood absorbed in 24 hours, and retained within its pores, the following volumes of the several gases named:

	Volume.
Hydrogen	1.75
Nitrogen	7.5
Oxygen	9.25
Carbonic oxide	9.42
Olefiant gas	35.
Carbonic acid gas	35.
Nitrous oxide	40.
Sulphuretted hydrogen	55.
Sulphurous acid	65.
Muriatic acid	85.
Ammoniacal gas	90.

Gaseous compounds of phosphorus obey the same general law, although the table from which we copy the above is defective in not stating the amount. All well pulverized earths have a similar property of condensing oxygen and other gases; and thorough tillage greatly promotes the condensation of vapors and gases about the roots of plants, to nourish them. Charred peat, muck, and wood are exceedingly valuable to mix with all manures to prevent the escape of fertilizing elements which are volatile and liable to rise into the atmosphere. Mr. Phillips gives the following analysis of Irish peat charcoal:

		Combustible.
Carbon	79.24	
Hydrogen	2.20	
Nitrogen	.54	
Oxygen	6.44	88.42
		Incombustible.
Clay and silica	2.48	
Oxide of iron	1.66	
Phosphoric acid	.34	
Silicate of potash	.98	
Chloride of sodium	2.53	
Carbonate of lime	1.85	
Sulphate of lime	1.44	
Loss	.30	11.58
		100.00

From the large per cent. of common salt (chloride of sodium) in the ash above described, it is probable that most of the plants which formed the peat grew in salt water, or marsh.

Charred muck, peat, and wood are coming into extensive use in deodorizing night-soil, aided by gypsum and common salt. By these means a fertilizer of great power and perfectly inodorous may be formed, suitable to be planted or drilled with all seeds. Well dried and finely pulverized clay is a valuable deodorizer, and is used by many millions of people in China and some parts of Europe, to mix with night-soil. In this way it can be thoroughly dried and not part with any of its gases. Copperas-water and diluted oil of vitriol poured over night-soil convert all the volatile into involatile elements.

To command water in dry weather, and get rid of the excess in rainy seasons, *deep tillage* is equally valuable. In the former case, moisture *ascends* from the subsoil by capillary attraction; and in the latter, the excess of water in the surface soil *descends* into the subsoil to meet an exigency of an opposite character. The skillful control of water is the first lesson in good farming.

RICE CROP OF SOUTH CAROLINA IN 1849.

We had a very mild winter until the middle of January. For many days in November and December fires were unnecessary. The shattered corn and rice in the fields, where well drained, vegetated and flourished until some time in January. The planting commenced the first week in March. The early rice was just above the ground, the water covering it being drawn in many instances, when we were visited (15th April) by a snow-storm, ushered in by sleet, which checked and suspended all vegetation, injured the young plants, killing many, and producing sad havoc among the trees, then in tender foliage.

On the 18th and 19th of April, frost affected the young rice, retarding its growth some weeks. The months of March and April were dry; May and June less so. During May and June the river (Pedee) was quite full, and the tides continued high throughout, until the 22d June. This prevented the land from draining very well, and in consequence, the early rice did not "grow off after the long water." The tides were very high during all the summer months, on the changes of the moon, and the wind fresh, and sometimes stormy and threatening. This impeded the harvest very much, and doubtless injured some rice. The weather for the most part was reported fine, inasmuch as there was little rain, and almost every day the sun peeped out. In July we had 19 days of rain, and in August, 14. It may have suited the corn very well, but not the rice, which was in blossom about the time of the rains, from 23d July to 15th August.

The crop of rice in 1848 reached 162,058 tierces in market; and of these, 160,330 tierces were exported from South Carolina. The crop of 1849 will probably be short of that, some 15,000 tierces. Still it will be an average crop. The quality of the grain is somewhat better this year than last. Sales of long grain rice have been effected this winter at $3.50 to $3.75; and in one or two instances, even $3.87½ or $4.00 per cwt.; while the market for ordinary prime ranged from $2.87½ to $3.18¾.

Planters are manuring their lands, as well as draining them better than formerly. Some five years ago, our Agricultural Society caused to be made, by Prof. Sheppard, an analysis of rice, the straw, chaff, flour, &c., a copy of which was forwarded by me to the Patent Office. Since that time, the flour, the chaff, and the straw have all been used as manure for rice land, and are deemed among the very best. The flour is best, but is too precious to be used by any but the wealthiest planters, having mills of their own, and not to any great extent even then. The chaff also can only be used by planters having mills of their own. It is spread even, over the surface, about 3 inches deep, and then ploughed in. The straw can be safely used when the field is fallowed. It is then put on the land, thick and bedded in, the more completely to decompose in time for the succeeding crop. This attention, together with improved cultivation, is supposed to have improved the grain, both in size and quality. Rice will keep a very long time in the rough—I believe a life-time. After being cleaned, if it be prime rice, and well milled, it will keep a long time in this climate: only when about to be used, if old, it requires more careful washing to get rid of the must, which accumulates upon it. I sent to Washington by Mr. Sims, two years ago, a specimen of rice prepared by the late venerable Francis Withers, as well as I remember, 18 years before. Some planters, the writer among the number, prefer for table use rice a year old to the new.

This grain is superior to any other provisions in this respect. If a laborer in the *gold-diggings*, or elsewhere, takes with him two days' or a week's provisions in rice, and his wallet happens to get wet, he has only to open it to the sun and air, and he will find it soon dries, and is not at all injured for his purpose. Rough rice may remain under water 24 hours without injury, if dried soon after.

I take leave to send you a few grains of a *second crop* in 1845. Also an ear of the *long-grain*, and *small-grain gold-seed* rice. As something has been said about the wild rice of Minesota, and its superior nutritive qualities, I send you also an ear of the red rice, (considered by us greatly inferior to the two above mentioned,) in order that you may compare the grain with that of the wild rice. This kind takes half as long again to be cleaned.

The samples of rice from Manilla, which we received by the attention of the Department of State, and distributed last year through Mr. Rhett, I am sorry to report did not vegetate. The writer had portions of the six varieties sown in different spots generally favorable; but they all failed. Probably no improvement would have been effected by success in this experiment, as the seed in question was greatly inferior to our own, so much so, that some of my neighbors utterly refused to plant it on their premises.

Rice Crop of 1848.

Plantation.	Barrels shipped. Whole.	Half.	Barrels of 600 lbs. net.	Net Weight.	Average Net Product per bbl.	Net Income. Amount.
1 Prospect Hill	1,387	10	1,495½	897,166	16 [illegible]/100	$24,000.98
2 Springfield *	737	5	801½	480,987	16 [illegible]/100	18,264.79
3 Brook Green*	1,571	15	1,716	1,026,405	16 [illegible]/100	28,260.86
4 Longwood	1,113	4	1,227½	786,418	15 [illegible]/100	19,021.70
5 Alderly	484	6	533	319,912	16 [illegible]/100	8,851.28
	5,292	40	5,773½	3,460,888		$98,399.51

* These plantations were sown with *long grain rice*; the remainder with *small grain*, except one, on which the seed was mixed.

These plantations were all on the river Waccamaw. If it be desirable, some examples may be furnished from some other rivers in the rice-growing region. The expenses of a well-supplied rice plantation may be stated at 33⅓ per cent. on net income.

R. F. W. ALLSTON.

GEORGETOWN, S. C., *21st Jan'ry*, 1850.

COTTON.

VARIOUS causes operated to reduce the crop of cotton grown in 1849, below that of 1848. Prominent among these, were severe frosts about the middle of April, in all the cotton-growing states, which destroyed the young plants, and left many planters without seed to repair their losses by planting anew. An excess of rain fell in the months of May, June, and July, which was followed by an unusual drought, soon after, in large districts. The immense quantity of rain that fell did additional damage, by causing rivers to overflow their banks and inundate vast areas of bottom land, to the destruction of cotton and other crops. These disasters were attended by the prevalence of cholera and other diseases of a fatal character, which induced the temporary abandonment of many rich and promising cotton fields. Insects did no inconsiderable injury, as usual, in all the cotton-growing States.

Had it not been for the industry that prompted the planting of more acres than were ever before devoted to this important staple, the supply of this year would be less by some 300,000 bales than it now is.

If the year 1850 shall prove favorable to the growth of cotton, and no serious misfortune befall the cultivators, a harvest of 3,000,000 bags may reasonably be expected. But no crop grown in the United States is more liable to casualties; and not till it is fairly gathered and housed can one feel safe from loss. The receipts up to the latest dates are as follows: (From the Augusta Chronicle and Sentinel of March 6, 1850.)

	1850.	1849.
Savannah, Feb. 26	244,505	237,365
Mobile, Feb. 22	263,302	392,114
New Orleans, Feb. 27	597,147	716,460
Charleston, Feb. 28	263,180	302,493
Florida, Feb. 20	118,128	107,251
Texas, Feb. 20	16,795	16,296
North Carolina, Feb. 16	5,919	2,158
Virginia, Feb. 1	5,275	5,780
	1,514,251	1,779,817

Decrease at New Orleans	119,318	
" " Mobile	128,812	
" " Charleston	39,318	
" " Virginia	505	287,943
Increase at Florida	10,877	
" " Texas	499	
" " Savannah	7,240	
" " North Carolina	3,761	22,377
Total decrease		265,566
Stock on hand.	1849–50.	1848–49.
New Orleans, Feb. 27	229,376	256,643
Mobile, Feb. 22	129,562	167,825
Florida, Feb. 20	48,716	46,548
Texas, Feb. 20	1,750	800
Charleston, Feb. 28	62,950	99,168
Savannah, Feb. 26	62,465	46,879
North Carolina, Feb. 16	550	200
Virginia, Feb. 1	750	650
	536,119	578,213
Decrease in stock		42,101
Stock in New York, Feb. 19	88,952	64,561
Exports.	1849–50.	1847–48.
Great Britain	437,651	673,417
France	148,694	153,731
Other foreign ports	81,417	139,265
Total foreign exports	667,762	966,413
Decrease in foreign exports		298,651
Shipments to Northern ports	473,816	425,814
Increase to the North		48,002

We omit quotations, only remarking that the sales made were about 11¼ and 11⅜ for good middling: 11¾ and 11⅞ for middling fair, and 12⅛ and 12½ for fair to fully fair and choice cottons.

We learn that contracts have been made for crops of nankeen cotton at 14 cents, for the next season.

The receipts of cotton at Augusta and Hamburg, up to the 1st of March, reach 208,628 against 226,260 bales last year, showing a deficiency in our receipts of 17,532 bales up to the 1st inst., and a deficiency of receipts in the month of February of 20,019 bales. The shipments so far this season reach 159,820 bales against 196,159 bales last year, and the stock in store 62,527 against 56,654 bales at same date. The total of receipts at the receiving points now reaches 1,514,251 against 1,779,817 bales last year, showing a decrease of 265,566 bales. The falling off is very heavy at Mobile and New Orleans, and the deficiency at other points is also on the increase.

The estimates lately received from New Orleans put down 850,000, and our calculation is, that the Atlantic will not exceed, if it reaches, 700,000 bales.

The foreign exports show a considerable falling off, and the stock in the Southern seaports shows a deficiency of 42,101 bales.

As the crop grown in a year is never all sent to market within any definite time after it is ginned and packed, (some always holding back for better prices,) nothing short of an actual and well-taken census can determine the quantity made in 12 months. The time approaches when some steps will be taken by each State to learn the amount of agricultural products annually called into existence within its limits. As has often been suggested by the writer and others, this can be done with little inconvenience by the assessors or collectors of taxes, in each county or parish, every year.

Every farmer can tell the amount of his last crops: and every one should know all that any dealer or consumer knows about what is annually grown and needed of the articles which he produces. Knowledge of this kind is exceedingly valuable to all classes, but peculiarly so to that great agricultural class who both feed and clothe the world.

Planters and farmers should regard the commercial world as members of one family, the extent of whose wants ought to be studied with nice discrimination, to avoid the errors of producing too much of some necessaries, and too little of others. There is considerable danger that planters will devote too much attention to cotton culture, and too little to growing grain, making meat, and the improvement of lands. The tide never rises so high as not to ebb and leave a wide beach and many a wreck behind.

The cotton grown in one State being often sent to market in another, as from North Carolina and Georgia to Charleston, and from Arkansas, Tennessee, and Mississippi to New Orleans, there are no reliable data to determine the quantity grown in any State. As the United States census will soon be taken, perhaps as early as this report will be printed and distributed, an estimate of the product by States will hardly be worth the expense of publishing in 130,000 copies. The aggregate is likely to be not far from 2,100,000 bales. The average cost of producing 100 lbs. of good cotton is a matter of general interest, and has elicited not a little discussion. Deriving his information from large planters, Mr. Solon Robinson thus estimates the profits and expenses of growing this staple:—

[From the National Intelligencer.]

"What does it cost a pound to grow cotton? This is a question of vast importance to the United States. Who can answer it? Not one in ten of those that make it their staple crop, I venture to say; for cotton planters are as careless in this respect as though they were conducting a business of cents and dimes, instead of dollars and eagles.

I therefore propose to give you an extract from my notes, which I have been taking during my extensive agricultural tour the past winter and spring, not only to show the character of the information that I have been gathering, but in the hope that it may induce others to come out and give more and better information, or point out any errors in my statements.

The cost of making 331,136 pounds of cotton last year upon one of the best plantations of South Carolina was $17,894.48, or a fraction over five

cents and four mills a pound, including freight and commission, as well as interest upon a fair valuation of property.

The cost, exclusive of freight and commission and including interest, of making 128,000 pounds upon the 'cane-brake lands of Alabama' last year was $6,676.80, a fraction over five cents and two mills a pound. This is considered the richest cotton land in the world, and although the crop was called a small one, it was probably about an average one. The field hands upon this place numbered seventy-five, counting all over twelve years old, which gives a fraction less than four and one-third bales to each. Now this crop has to be hauled over about twenty-five miles of the worst roads in the world, when wet, as they usually are at the time the crop is ready to go to market, and then down the difficult and dangerous navigation of the Tombigbee river.

I am satisfied that these two crops give a better showing than three-fourths of the cotton crops of the United States. My own opinion is, that whenever cotton is below six cents it does not pay interest upon the capital invested, except perhaps in some few instances.

Below I give a table of items of expense upon the first plantation mentioned. This is owned by Colonel J. M. Williams, of Society Hill, and lies upon what is called the swamp-lands of the Pedee river. These items are necessary to show that I have not stated the expenses too high.

The capital consists of 4200 acres of land, (2700 in cultivation,) at $15	$63,000.00
254 slaves at $350 each, average old and young	89,900.00
60 mules and mares, and 1 jack, and 1 stud, average $60	3,720.00
200 head of cattle, at $10	2,000.00
500 " hogs, at $2	1,000.00
23 carts and 6 wagons	520.00
60 bull-tongue ploughs, 60 shaving ploughs, 25 turning do., 15 drill do., 15 harrows, at an average of $1.50 each	262.00
All other plantation tools estimated worth	1,000.00
Total	$161,000.00
Cash expenses:	
Interest is only counted on the first five items, $158,620, at 7 per cent	11,103.00
3980 yards Dundee bagging, at 16 cents, (5 yards to a bale,)	636.80
3184 lbs. of rope, at 6 cents	191.04
Taxes on 254 slaves, at 76 cents	193.04
Taxes on land	70.00
Three overseers' wages	900.00
Medical attendance, $1.25 per head	317.00
Bill of yearly supply of iron, average	100.00
Ploughs and other tools purchased, annual average	100.00
200 pairs of shoes, $175; annual supply of hats, $100	275.00
Bill of cotton and woolen cloth	810.00
100 cotton comforters, in lieu of bed blankets	125.00
100 oil-cloth capotes, (New York cost,)	87.50
20 small woolen blankets for infants	25.00
Calico dress and handkerchief for each woman and girl, (extra of other clothing,)	82.00

Christmas presents, given in lieu of "negro crop"	175.00
50 sacks of salt	80.00
Annual average outlay for iron and wood-work for carts and wagons	100.00
Lime and plaster bought last year	194.00
Annual average outlay for gin, bitts, &c	80.00
400 gallons molasses	100.00
3 kegs of tobacco, $60; 2 bbls. of flour, $10	70.00
⅝ of a cent a pound on cotton for freight and commission	2,069.60
	17,879.48
The crop of cotton at six cents will amount to	19,868.16

Colonel Williams has also credited this place with the additional items drawn from it.

13,500 lbs. of bacon taken for home, place, and factory	675.00
Beef and butter for ditto and sales	500.00
1100 bushels of corn and meal for ditto and sales	550.00
80 cords of tan bark for his tan-yard	480.00
Charges to others for blacksmith work	100.00
Mutton and wool for home use and sales	125.00
	$22,298.16

Profits over and above interest and expenses upon this total are $4,403.68.

Counting cotton only at six cents, profits are $1973.68; counting it at seven cents, ($23,179.52,) and profits are $5285.04. It is proper to state that part of the crop was sold at seven cents, and it may average that.

Now it must be borne in mind that this is one of the best plantations, as well in soil as management, and that this was an extraordinary good crop. It must also be assumed that the land will continue to maintain its fertility and value, and that the same hands will keep the building in repair, as no allowance is made in the expense account for such repairs, or there will be a loss under that head.

Most of the corn and meal credited comes from a toll mill on the place. All the cloth and shoes are manufactured by Colonel Williams, but upon a distinct place.

The place mentioned in Alabama belongs to Robert Montague, Esq., of Marengo county.

The items of valuation are:

1100 acres of land, at $25	$27,500.00
120 slaves, at $400	48,000.00
4 wagons	400.00
5 yoke of oxen, at $30	150.00
30 mules and horses, at $75	2,250.00
4000 bushels of corn on hand for plantation use, at 35 cents	1,400.00
Fodder and oats on hand for plantation use	200.00
40 head of cattle, at $5 ....do.	200.00
70 head of sheep, at $2 ....do.	140.00
250 head of hogs ....do.	600.00

20,000 lbs. bacon and pork for plantation use	1,000.00
Ploughs and all other tools ......do	500.00
	$82,240.00
Interest on capital at 7 per cent	5,756.80
Cash expenses, taxes, average	100.00
Blankets, hats, and shoes, (other clothing all home-made,)	250.00
Medical bill, average not exceeding	40.00
500 lbs. of iron, $30; hoes, spades, &c., $30	60.00
Average outlay for mules over what are raised	100.00
Average expense yearly for machinery repairs	20.00
Bagging and rope	350.00
	$6,676.80

This crop (28,000 lbs.) at six cents net will leave a balance of $1004.20, which is just about enough to pay the owner common wages of an overseer, which business he attends to himself.

Now, while there may be a few better places, there are thousands not near as good in all the cotton-growing region.

I am, most respectfully, &c.

SOLON ROBINSON.

WASHINGTON, *June* 4, 1849."

Both of the above estimates are defective and erroneous, but they supply data which will aid in eliciting the truth. No allowance is made in either case for the increase in number and value of the slaves in the course of a year. If this is not equal to 7 per cent. on an average, it is to $3\frac{1}{2}$ per cent., and sometimes reaches 8 or 10 per cent. The calculation is faulty in estimating a great deal more land than is planted, at $15 per acre in one instance, and $25 in the other. The latter price is three times larger than the average of cotton plantations at the South.

Although there are branches of agriculture more profitable than making cotton at six cents a pound, that is not an ill-rewarded business, if skillfully conducted. The way to secure better prices is to be fully prepared to encounter returns smaller than six cents. It is plain that if planters will generally make their own meat, raise their own mules and horses, produce wool enough to pay for all the woolen cloth they need on the plantation, and manage to have a few hundred pounds of butter to sell after supplying their own table, there will be little danger of overstocking the markets with cotton and depressing the price below 8 or 10 cents a pound. On the other hand, while two-thirds of a crop will bring more money than a full one, the sum received for cotton will be nearly so much clear surplus over and above all contingent expenses for the current year. There are three cardinal objects to be pursued in farming or planting:

1st. To make a comfortable and independent living.

2d. To keep the soil one cultivates constantly improving, so that all the crops grown may be produced at less cost.

3d. To lay up property or capital beyond the attainment of the objects above indicated.

It would be easy to write an essay on each of these points; but instead

of this, it is believed that a better service will be done to the cotton-growing interest to copy from the Southern Cultivator, some practical remarks on the preparation of seed and land in cotton culture, from a gentleman of large experience, and well known as a writer on rural topics:—

REMARKS ON THE CULTIVATION OF COTTON.

BY DR. M. W. PHILIPS, OF MISSISSIPPI.

No. 1. *Preparation of Land.*—In writing out the detailed plan I pursue in the cultivation of cotton, I must begin, I suppose, on the 1st of January, so as to carry your readers regularly through. I will endeavor not to be tedious, yet I cannot possibly be minute without at least being tiresome to somebody—as there is always somebody who already knows every thing.

For ten years past I have thrashed down all cotton-stalks, cut down all corn-stalks, and turned them under as well as possible with a turning-plough. When planting cotton after corn, I strive to break up the land with two-horse ploughs—what I term flushing, that is, breaking up 30 to 50 feet beds. Last year I broke up every acre of land I planted with two-horse ploughs, whether planted in cotton, corn, oats, or potatoes.

If any land has been in cotton, I generally open out water-furrows, deep, with a shovel-plough; to this I throw two furrows, one on each side, with one or two-horse turning-ploughs. Thus the land remains until a day or two before I wish to plant, when I have the baulk broken out, thus having fresh earth to plant upon, and yet firm earth for the seed to be planted in. There will be a narrow ridge of earth not covered by the fresh earth, but I invariably run an iron-tooth harrow along the ridge so as to break clods, and rake off pieces of stalk, and to leave the ridge fresh; if once running the harrow will not do, I run it twice.

The opener then follows and opens out a furrow, say one-half inch is deep enough, and narrow; if this furrow could be as straight as a bee line, and half an inch wide, I would esteem it better, if upon level land. The seed is scattered thinly and regularly, then covered with a board or block; I would prefer a roller. As to distance, this depends upon quality, age, and locality of land, rich and fresh land requiring greater distance; and I am inclined to think that the same quality of land north of say 33°, will tend more to longer joints than does cotton about 31° to 33°, and particularly Western lands, these lands tending to short joints, and greater yield to height of cotton. I do not plant any land that requires rows to be over five and a half feet, even to grow 15 to 20 cwt. of cotton per acre. There is sometimes, I am sure, much loss by too sparse planting. I desire to have the plants meet in the rows by the first of August, and should it after this date lap in row, the crop will not be materially injured. I find the new varieties, as sugar-loaf and cluster, to require less distance both ways than does the Mexican. When I planted my crop with Mexican—Petit Gulf—I gave 5 to $5\frac{1}{2}$ feet by 2 to 3 feet on my best land.

For four years I have grown sugar-loaf, and $4\frac{1}{2}$ feet by 18 to 24 inches, preferring about 18 inches. Upon second quality of land I reduce distance to 4 feet less, by 18 inches. Upon this department of planting (the preparation) I use more time and labor than is usual, being careful to break up deep, throw out into beds all the land, leaving no unploughed ridges; the ridges I endeavor to pulverize well, and do not run ploughs unless land will

pulverize, thinking ploughing may be done too early and land injured by being ploughed wet. My object in ploughing, say 3 furrows, early, is to permit the foundation of ridges to settle somewhat, as seed germinates freer and grows off better than upon light earth. I break out the residue as late as planting time, so that the plant will start before or with the grass and weeds. I prefer never more than a bushel of seed per acre, because solitary stalks are not injured by cold weather when scraped out as when grown in a hot-bed.

I have been asked how I plant seed when I buy. I reply I wet the seed thoroughly with salt and water, and sometimes use brine made by steeping stable manure in salt and water for 10 days before wanted, until fermentation has ensued. The seeds are then dried off with ashes, or lime, or plaster; I prefer the two latter, as the seeds are white, and the master can see that care in dropping is practiced by hands. These seeds are dropped at the required distance, and are covered with the foot, by brushing a little earth upon the seeds and pressing them into the earth with the foot. I would prefer a seed-planter, but could not make the one I tried drop regular. Five to ten seeds in a place are ample. I have dropped only one, and two, and three; when I did this myself, I failed not in a stand.

When a good ridge, clean of clods and litter, a hand can scrape more; the labor of planting carefully, and time seemingly lost in this, as well as of dropping seed, is fully regained in the scraping. I have cultivated for ten years 9 to 10 acres of cotton, and 8 to 9 of corn, besides potatoes, oats, &c. This could not have been done, but by doing all work well; time is saved by good ploughing and neat planting.

No. 2. *Preparation of Land and Planting.*—Last night, I gave you the preparation and planting of the cotton crop; yet I could not, in length of one article, give more than a rapid survey. I prefer short articles, and yet it is best to be particular, even minute, though there is even here an objection, for a writer should leave something for his readers to think of. When I plant oat-land, land that was the year previous at rest, or corn-land, I invariably break up into large beds, size according to width of rows to be planted, so as to throw water-furrow of the flushing as a water-furrow of the row. When four feet rows, I run off land thirty-two feet, and keep furrows as straight as possible on level land. I then lay off rows, always with a shovel-plough, and then two furrows as before. Sometimes I open out the water-furrow of old rows, as deep as two mules can draw a shovel-plough; bed up to this entire, then open out a new water-furrow deep, and reverse two furrows with a one-horse plough. I am satisfied that there is no land I plant but what is materially benefited by breaking up with a two-horse plough; thus all trash, grass, seed, &c., is well buried below the one-horse plough furrow. I use a piece of wood two or three feet long, running level on the land, the front end shod with iron, for the purpose of opening out furrows for planting seed. My object is to make a clean, straight furrow, and impact the loose earth. This stick of wood is rounded below, and fastened to a shovel-plough stock.

The straighter the row on level land, or the more regular on rolling land, if circling be practiced, the closer can the scraper be run, thus giving less labor to hoe hands, and if cotton seed be scattered very regular, so as to give a stand, no stalks touching, the hoe hand can thin out faster, and thus save time. If I were able to plant my cotton crop with the neatness and order with which Col. Wade Hampton plants his crop, I believe I could cultivate an acre or two more per hand. Being in company with him in 1847, on a steamboat, we discussed the subject of planting for hours, and he assured me that all his furrows were opened out for planting with the corner of the hoe, narrow and straight. If I could drop seed in a furrow only an inch wide and quite straight, I think I could manage two acres of scraping per day to each full hand; I regard planting a crop, if done in the best manner, more in the light of half cultivated, than many would believe. I have scraped three acres in a day. I can dirt easily four acres per horse, and can with the solid sweeps break out four to nine acres per horse, owing to whether rows be four or five feet wide; thus, besides the earthing furrow, it requires one or two to sweep out the middle. But land has to be put in good order, and seed planted in order. This matter has called for many a line from my pen in the different papers I have written for, and I must be pardoned for thus dwelling so long. It is really no interest of mine whether planters cultivate well or ill; whether they can cultivate a fair crop easily or not, I cannot be benefited; yet as a citizen of this beautiful world, as a sojourner in this southern clime, I feel an abiding interest in the welfare of my fellows. Therefore, I say, if planters will devote more care and attention in tilling their lands, and in putting in their crops in a good manner, they will be able to make more, and yet spare their servants and their beasts much labor in the cultivation.

Look at the garden. Take one bed and trench it, spade up two spades deep, reversing the soil even, what will be the result? But suppose the first spit be laid one side, then the second spit well and finely dug up, the first returned reversed, or thoroughly mixed, will not that bed be more or less moist all the year? And if there is any chance for water to pass off, will it not be fit to work, after a rain, sooner than any part of the garden? and must it not, of necessity, produce better?

I admit a planter cannot plant so great a crop, but he will need much less to make an equal crop.

The misfortune is, the body of cotton planters want a large crop, and will not be at the expense of team and tools. Would they not ridicule the carpenter, who, instead of getting tools to tongue and groove his flooring, would attempt to rabbet each side of plank, or to dig grooves, and then dig for a tongue with a chisel? And yet, though not quite so absurd, planters so act. What difference in cost in twenty years, if a planter buys six shovels, six one-horse turning-ploughs, three two-horse turning-ploughs, six scrapers, six harrows, or to buy all turn-ploughs? These same ploughs will last by changing, those not used to be taken care of, as long as the same number of one kind, and for all work. "Think ye, and judge ye."

Mr. Simeon Oliver, of Hernando, Miss., writes us that the average yield of seed cotton is 1000 lbs per acre in that county, and the cost of production about 6 cents a pound. The *sugar-loaf cluster*, or Prout variety, yields best.

Mr. E. A. Holt, of Montgomery, (good authority,) estimates the crop of Alabama for 1849 at 400,000 bales. The Mexican or Petit Gulf is regarded as the best variety.

Dr. David L. White, of Florida, writes, that the average yield per acre there is 800 lbs., and per hand from 3 to 4 bales. Petit Gulf is preferred; of the upland class of plants, seed of long staple obtained from South Carolina.

From St. Francis Co., Arkansas, as Mr. J. W. Calvert writes, they gather

about 1000 lbs. of seed cotton from an acre, in some instances much more. Varieties grown, Mastodon, Mexican, &c. He prefers Mastodon for their land, and Mexican for rich soils. No manure except cotton seed is used.

In south-western Texas, cotton crops are quite uncertain and irregular. Mr. Pryor Lea writes, that the worm does great injury; but aside from these casualties, a bale of cotton per acre and ten per hand are a common return.

In the north of Alabama, as Mr. James Williams, of Jackson Co., informs us, the crop is very light. He regards cotton at 6 cents a pound as a better crop than corn or wheat.

Mr. Thomas A. Heard, of Clark Co., Ark., estimates the cost of growing a bag of cotton at $25, where, he says, the average is 1200 lbs. per acre; some lands go as high as 2500 lbs., which would turn out nearly two bales, or 800 lbs.

Mr. Samuel S. Graham, of Coosa Co., Alabama, says that cotton will grow on land too poor for wheat. He estimates the crop of the State at 450,000 bales of 500 lbs. each. Cost of production, five cents a pound; average yield, 150 lbs. of clean cotton per acre.

Lands cultivated in cotton are extremely liable to injury by washing rains. The warmer a climate, the more water the air will hold in the form of an invisible vapor, or of clouds, and the more sudden and voluminous the fall of showers. A large portion of the water thus precipitated upon the mellow soil runs off, and carries with it, even where it forms no gulleys, much of the fine particles of mould, loam, and clay. In this connection, it is important to bear in mind that it is the smallest fragments of rocks and decaying plants and insects, which dissolve in water and enter the roots of cultivated vegetables to nourish them. Hence, the organic and inorganic matter borne along in a muddy stream (and all streams that flow over ploughed ground are muddy) robs the soil of its fertility vastly more than would the removal of an equal weight of coarse sand, gravel, or compact clay. One valuable means of preventing the wash of hoed fields is to seed them in autumn as early as practicable, with some small grain, such as rye, barley, wheat, or oats. These plants will not only serve to prevent the washing of the ground, but they will imbibe volatile and involatile food from the soil, which would be lost without their presence. In addition to this, the winters are warm enough at the South for small grains to grow and draw largely upon the atmosphere for their organic elements. These crops, consumed by sheep or other animals, will yield valuable meat and not a little equally valuable manure. So soon as cotton and corn cease to grow, and peas are ripe when planted in cornfields, rye or some winter grain should be sown for the benefit of the land. The winter is the time to renovate the soil at the South. Particular pains should be taken in saving cotton seed, and the droppings from all domestic animals in stables and yards. Manure has been found in so cold a climate as that of Scotland to lose three-fourths of its fertilizing power in a few months, if permitted to lie out in an open yard and exposed to rains and sunshine.

ANALYSIS OF COTTON SEED AND WOOL.

BY PROF. W. SHEPPARD, OF S. C.

One hundred parts of cotton wool, on being heated in a platina crucible, lost 85.89 parts. The residuum, on being ignited under a muffle till the whole of the carbon was consumed, lost 12.735, and left a white ash which weighed nearly 1 per cent., or 0.9347. Of this ash, nearly 44 per cent. was soluble in water. Its constituents were as follows:

Carbonate of potash, (with a trace of soda,)	44.29
Phosphate of lime, (with a trace of magnesia,)	25.84
Carbonate of lime	8.97
Carbonate of magnesia	6.75
Silica	4.12
Sulphate of potassa	2.90
Alumina	1.40
Chloride of potassium, Sulphate of lime, Phosphate of potassa, Oxide of iron, (a trace,) and loss	6.23
	100.00

Analysis of Cotton Seed.—One hundred parts, treated as before, lost 77.387, and the residuum, after being burnt under a muffle, left 3.986 parts of a perfectly white ash, the composition of which was as follows:

Phosphate of lime, (with traces of magnesia,)	61.34
Phosphate of potassa, (with traces of soda,)	31.74
Sulphate of potassa	2.65
Silica	1.68
Carbonate of lime	47
Carbonate of magnesia	27
Chloride of potassium	25
Carbonate of potassa, Sulphate of lime, Sulphate of magnesia, Alumina and oxide of iron, and loss	1.68
	100.00

PRIZE ESSAY ON THE CULTURE AND MANAGEMENT OF TOBACCO.

BY W. W. W. BOWIE, ESQ., OF PRINCE GEORGE'S CO., MD.

[The Publisher of the AMERICAN FARMER having offered a piece of silver plate of the value of $30 for the best Essay on the above subject, the Committee, consisting of Messrs. H. G. S. KEY, J. S. SELLMAN, GEO. W. HUGHES, JOHN D. BOWLING, and W. C. CALVERT, of Maryland, awarded the prize for the following Essay.]

A RICH loam is the soil for tobacco plants. The spot selected for a bed should be the south side of a gentle elevation, as well protected as possible by woods or shrubbery—a warm spot—mellow ground, perfectly pulverized. After a thorough burning of brush and tobacco stalks mixed, dig deep, and continue to dig, rake, and chop, until every clod, root, and stone be removed; then level and pulverize nicely with the rake. Mix one gill of seed for every ten square yards, with a quart or half gallon of plaster or sifted ashes to every half pint of seed, and sow it regularly, in the same manner that gardeners sow small seeds, only with a heavier hand. Roll with a hand-roller or tramp it with the feet. If the bed be sown early, it ought to be covered with brush free from leaves; but it is not necessary to cover them after the middle of March. Tobacco beds may be sown at any time during winter if the ground be not too wet or frozen. The *best* time for sowing is from the 10th to the 20th of March, although it is safest to sow at intervals, whenever the land is in fine order for working. Never sow unless the land be in good order, for the work will be thrown away if the land be too moist, or be not perfectly prepared. The beds must be kept free from grass or weeds, until they are no longer needed, and the grass must be picked out a sprig at a time by the fingers. It is a tedious and troublesome operation, therefore planters should be very careful not to use any manures on their beds which have grass seeds or weeds in them. After the plants are up they should receive a slight top-dressing of manure once a week, sown broadcast by the hand. This manure should be composed of half a bushel of unleached ashes, (or 1 bushel of burnt turf,) 1 bushel of fresh virgin woods earth, 1 gallon of plaster, half a gallon of soot, 1 quart of salt dissolved in 2 gallons of liquid from barn-yard, and 4 lbs. of pulverized sulphur, the whole, well intermixed. Let a large quantity be got together early in the winter and put away in barrels for use when wanted. This and other such mixtures have been found efficacious in arresting the ravages of the fly,—both from the frequent dusting of the plants and the increased vigor which it imparts to them, thereby enabling the plant the sooner to get out of that tender state in which the fly is most destructive to it. The fly is a small black insect, somewhat like the flea, and delights in cold, dry, harsh weather, but disappearing with the mild showers and hot suns of opening summer. If possible, the plants should stand in the bed from half an inch to an inch apart, and if they are too thick they must be raked when they have generally become as large as a five or ten cent piece. The rake proper for the purpose should be a small common rake with iron teeth, 3 inches long, curved at the points; teeth flat, and three-eighths of an inch wide, and set half an inch apart.

After-culture, &c.—The soil best adapted to the growth of tobacco is a light friable soil, or what is commonly called a sandy loam, not too flat, but rolling undulating land—not liable to drown in excessive rains. New land is far better than old. Ashes are decidedly superior to any other fertilizer for tobacco. Theory and practice unite in sustaining this assertion. The land intended for tobacco should be well ploughed in April, taking care to turn the turf completely under, and subsoiling any portions that may be very stiff and likely to hold water near the surface, and let the land be well harrowed directly after the breaking it up; it should then be kept clean, light, and well pulverized by occasional working with cultivators and large harrows so as not to disturb the turf beneath the surface. When the plants are of good size for transplanting, and the ground in good order for their reception, the land, or so much as can be planted in a "*season*," should be "*scraped*," which is done by running parallel furrows with a small seeding plough, (the Davis or Woods plough for instance,) two and a half feet apart, and then crossing these again at right angles, preserving the same distance, which leaves the ground divided in checks or squares of two and a half or three feet each. The hoes are then put to work and the hill is formed by drawing the two front angles of the square into the hollow or middle, and then smoothed on top and *patted* by one blow of the hoe. The furrows should be run shallow, for the hills should be low and well levelled off on the top, and, if possible, a slight depression near the centre, so as to collect the water near the plant. The first fine rain thereafter, the plants should be removed from the seed beds, and one carefully planted in each hill. A brisk man can plant 10,000 plants per day. The smaller or weaker hands, with baskets filled with plants, precede the *planters* and *drop* the plants on the hill. In drawing the plants from the bed, and in carrying them to the ground, great care should be taken not to bruise or mash them. They ought to be put in baskets or in barrels, if removed in carts, so that not many will be in a heap together. The plants should never be planted deeper than when they stood in the bed.

Planting is done by seizing the plants dropt on the hill with the left hand, while with one finger of the right hand a hole is made in the centre of the hill, and the root of the plant put in with the left, while the dirt is well closed about the roots by pressing the forefinger and thumb of the right hand on each side of the plant, taking care to close the earth well about the bottom of the root. If sticks are used to plant with, they should be short, and the planter should be particular not to make the holes too deep. The plants should be very carefully planted, for if the roots are put in crooked and bent up, the plant may live, but will never flourish, and perhaps, when too late to *replant*, it will die, and then all the labor will be of no avail. In three or four days it may be weeded out, that is, the hoes are passed near the plants, and the hard crust formed on the hills pulled away, and the edges of the hill pulled down in the furrows; this is easily done if performed soon after planting, but if delayed, and the ground gets grassy, it will then be found a very troublesome operation. After "*weeding*" out, put a tablespoonful, or a gill if it be preferred, of equal parts of plaster and ashes well mixed, upon each plant. In a few days, say a week or less time, run a small plough through it, going twice in a row. This is a delicate operation and requires a steady horse and a skillful ploughman, for without great care the plants will be knocked up or be killed by the working. In a week after the *tobacco cultivator* or *shovel* must be used. These implements are well made by R. Sinclair, Jr. & Co., of Baltimore. Either implement is valuable at this stage of the crop. But once in a row is often enough for either cultivator or shovel to pass. The crop can now be made with their use by working the tobacco once a week or ten days, for four or five

weeks, going each time across the former working. Any grass growing near the root of the plants should be pulled out by hand. As soon as the tobacco has become too large to work without injuring the leaves by the swingle-tree, the hoes should pass through it, drawing a little earth to the plants when required, and level the furrows caused by the cultivator and shovel. Let this hoeing be well done, and the crop wants no more working. Care should be taken to leave the land as level as possible, for level culture is most generally best. When it blossoms, the best plants ought to be selected for seed; one hundred plants being enough to save for seed to sow a crop of 40,000 pounds. All the rest should be "*topt*" before they blossom—indeed, as soon as the blossom is fairly formed. It should be *topt* down to the leaves that are six inches long, if early in the season, but if late, top still lower. If the season be favorable, in two weeks after a plant has been "*topt*" it will be fit for "*cutting*," yet it will not suffer by standing longer in the field. From this stage of the crop until it is in the house, it is a source of great solicitude and vexation to the planter. He is fearful of storms, of frost, and *worms*, his worst enemy—they come in crowds—"their name is Legion"—and the "*suckers*" are to be pulled off, and the "*ground leaves*" are to be saved. The "*suckers*" ought to be pulled off when they get three or four inches long; they spring out abundantly from each leaf where it joins the stalk. "*Ground leaves*" are those leaves at the bottom of the plant which become dry on the stalk, and ought to be gathered early in the morning when they will not crumble.

The worms ought to be pulled off and killed as fast as they appear, or they will soon destroy the crop. Turkeys are of great assistance in destroying these insects; they eat them and kill thousands which they do not eat, for it seems to be a cherished amusement of the turkey to kill worms on tobacco—they grow passionately fond of it—they kill for the love of killing. There are every year two "*gluts*," as they are called by planters; the first attacking the plants about the time that they are one-third or half grown, the other comes on when the tobacco is ready for cutting. The first can easily be subdued with a good supply of turkeys, and if *then* they are effectually destroyed, the second *glut* will be very easy to manage, for it is the opinion of many intelligent and experienced planters that the greater portion of the first *glut* reappear the same year as *Horn-blowers* and breed myriads. When the second army of worms makes its appearance, the tobacco is generally so large that turkeys do but little good. The only method then to destroy them is to begin in time, start when they are being hatched, and keep up a strict watch upon them, going over the whole field, plant by plant, and breaking the eggs—killing such as may be seen, and by constant attention during each morning and evening to this business alone, with the whole force of the farm, they may be prevented from doing much harm. When they disappear the second time, there is no more cause of trouble. For a full entomological description of the tobacco worm, and the easiest and most effectual method of rendering them comparatively harmless, I beg leave to refer the reader to a letter written to J. S. Skinner, Esq., by the author of this essay, and published in the Farmers' Library in 1848. When the plant begins to yellow, it is time to put it away. It is cut off close to the ground by turning up the bottom leaves and striking with a tobacco knife, formed of an old scythe—such knives as often are used for cutting corn. Let it lay on the ground for a short time to "*fall*" or wilt, and then carry it to the tobacco house, when it may be

put away in three different modes, by "*pegging*," "*spearing*," and "*splitting*." "*Pegging*" tobacco is the neatest and best mode, yet the slowest. It is done by driving little pegs, about six inches long and half an inch or less square, into the stalk about four inches from the big end of the stalk; and these pegs are driven in with a mallet, in a slanting direction, so as to hook on the sticks in the house. It is then put on a "*horse*," which, by a rope fixed to one corner, is pulled up in the house, and there hung upon the sticks, which are regulated at proper distances. A "tobacco horse" is nothing more than three small sticks nailed together so as to form a triangle, each side being three or four feet long. Spearing is the plan I pursue, because it is neat enough and decidedly the quickest plan. A rough block with a hole morticed in it, and a little fork a few inches from the hole for the tobacco stick to rest upon, one end being in the hole, with a spear on the other end of the stick, is all the apparatus required. The plant is then with both hands run over the spear, and thus strung upon the stick, which when full is taken to the house and hung up at once. There are "*dart-spears*," like the Indian dart in form, and "*round-spears*;" either, however, will answer.

"*Splitting*" tobacco is admired by many who contend that it cures brighter, certainly quicker, and less likely to *house-burn* or injure from too thick hanging. This mode is pursued easily by simply splitting, with a knife made for the purpose, the plant from the top to within a few inches of the bottom, before it is cut down for housing. Care should be taken not to break the leaves while splitting the stalk. The knife for splitting may be fully described by saying it is a miniature spade. It can be easily made out of an old scythe blade, inserted in a cleft white oak handle with its edges bevelled off to the blade, so that it acts as a wedge to the descending knife. After the tobacco is split, cut down, and carried to the house, it is straddled across the sticks and hung up. The sticks are generally supported by forks driven in the ground near the heap of tobacco, for greater convenience to the person putting on the plants.

Tobacco sticks are small round sticks, or are split out like laths, and are about one inch square, or one and a half inches square, usually larger at one end than the other, and they should be eight or ten inches longer than the joists of the tobacco house are wide apart. If the tobacco is of good size, six or seven plants are enough on a four-foot stick. When first hung up, the sticks should be a foot or fifteen inches apart. As the tobacco cures they may be pushed up closer. After a house is filled, some planters put large fires under it, as soon as it has turned yellow, and by hot fires it is dried at once and does not change color, unless to increase its brightness; but "*firing*" gives a smoke, smell, and taste that is therefore not much liked by buyers. The cost of labor and loss of wood, and the risk of losing tobacco, and the house too, are great objections well urged against *firing*. The better plan is to have sufficient house-room and hang it thin in houses not too large, which have windows and doors so as to admit light and dry air, and by closing them in bad weather, exclude the rain and dampness, which materially damage the tobacco, besides injuring the color of it. After becoming dry and well cured, the stem of the leaf being free from sap, the first mild damp spell of weather it will become soft and pliant, and then be stript off the stalk. It is first pulled or taken off the sticks and put in piles, then the leaves are stript off and tied in bundles of about one-fifth or sixth of a lb. in each. The bundle is formed by wrapping a leaf around

the upper part of the handful of leaves, for about four inches, and tucking the end in the middle of the bundle, by way of confining it. There ought, if the quality of the crop will permit, to be four sorts of tobacco, "*Yellow*," "*Bright*," "*Dull*," and "*Second*." When the tobacco is taken down, the "*cullers*" take each plant and pull off the defective and trashy ground and worm-eaten leaves that are next to the big end of the stalk, and then throw the plant to the next person, who strips off all the *bright* leaves, (and if there be any yellow leaves, he lays *them* on one side until he has got enough to make a bundle,) and throws the plant to the next, who takes off all the rest, being the "*dull*;" and the respective strippers, as they get enough leaves in hand, tie up the bundles and throw them separate for convenience in bulking. Stripping should never be done in drying, or harsh weather, unless the tobacco is bulked up almost as fast as it is stript. The best plan is not to take down more than you can conveniently tie up in a few hours; but if the planter chooses he may take down a large quantity and put it in bulk, stalks and all, cover it with tobacco sticks, and it will keep many days, so that, no matter how the weather be, he can strip out of the bulk. However, this is a very bad, wasteful way. Tobacco should not be too moist, or "*high*" as it is termed, when put in the stalk-bulks, or it will get warm, the leaves stick to the stalk, get a bad smell, and change color; besides, if left too long it will rot. To "*bulk*" tobacco requires judgment and neatness. Two logs should be laid parallel to each other about thirty inches apart, and the space between them filled with sticks, for the purpose of keeping the tobacco from the dampness of the ground. The bundles are then taken one at a time, spread out and smoothed down, which is most conveniently done by putting it against the breast and stroking the leaves downward smooth and straight with the right hand. It is then passed two bundles at a time to the man bulking. He takes them, lays them down and presses them with his hands; they are laid two at a time in a straight line—the broad part of the bundles slightly projecting over the next two, and two rows of bundles are put in a bulk, both rows carried on together, the heads being on the outside and the tails just lapping one over the other in regular succession. The *bulk*, when carried up to a convenient height, should have a few sticks laid on the top to keep it in place. It must often be examined, and if getting warm, it ought to be immediately changed and laid down in another bulk, of less height, and not pressed as it is laid down; this is called "*wind-rowing*;" being loose and open, it admits the air between the rows of bundles, hence the term. The next process in this troublesome but beautiful crop is to "*condition*" it for "*packing*." The *bright*, *yellow*, and *second* tobacco will condition best most generally in such bulks as I have just described, but it is best to hang up the *dull* as soon almost as stript. If the bright or seconds do not dry thoroughly in the bulks, that should also be hung up in the house to become well dried. To properly hang up tobacco to condition, small-sized sticks should be procured, and each one nicely smoothed with the drawing-knife and kept for that purpose. After it has once been perfectly dry either hanging up or in bulks—so dry that the heads are easily knocked off and the *shoulders* of the bundles crack upon pressure like pipe-stems—it should be taken down, or, if in bulks, removed the first soft giving spell of weather, as soon as it is soft and yielding enough, as it will become, to handle without crumbling or breaking, and it must be put in four, six, or eight row bulks of any convenient length and height, the higher the better—laid down close so that as

little of the leaves or shoulders as possible shall be exposed on the outside of the bulks. When completed, put sticks and logs of wood, &c. &c. on the top, so as to weigh it down. Here it will keep sweet and in nice order for packing at any time, no matter what the weather may be; if it was conditioned properly, it will not change a particle while in the *condition bulk*. Mild, soft, pleasant weather is the best to pack tobacco in. The best tobacco prize is one known as "Page's Prize," but was first invented by the Rev. Mr. Aisquith, and improved afterwards by Page, at the suggestions of practical planters. It is very cheap, expeditious in its working, and being easily taken down and put up, may with convenience be moved from house to house.

As to the size of the hogsheads, the best size is the ultimatum of the law, forty inches in the head and fifty-two in the length. Almost any wood will answer to saw into hogshead stuff, the best, of course, is that which is strong but weighs light, such as gum or beach, or birch or poplar. No hogshead ought to weigh over 100 lbs. and staves drawn out of red oak, or other oaks, which make the best hogsheads, but are too costly, ought not to weigh over 90 lbs.

Having now got our tobacco in good order, our prize and hogsheads ready, the first mild day that we can spare, we proceed to *packing*. Let me here observe that while putting the tobacco in condition bulk, all the bundles that were *soft*, or had an ill smell, ought to have been laid aside to be made sweet and dry, by a few hours' exposure to the sun. The same precaution *must* be observed while packing. In putting the tobacco in the hogshead for packing, a man gets inside, *shoes off*, and lays one bundle at a time in a circle, beginning in the middle, and each circle is extended until the outer circle touches the staves of the hogshead; a single row of bundles is then laid all round the edge on the heads of the last circle, then across the hogshead in parallel rows, the middle being always raised a little higher than the outer edge. This is called a *course*, and these *courses* are continued until the hogshead be filled. The man who is packing presses with his knees each bundle, in each course, as he lays it, and often stands upon his feet and tramps heavily but cautiously, all round and across, so as to get in as much as possible. One receiving hogshead and two false hogsheads five feet long, making fourteen feet four inches of tobacco, will weigh from nine hundred to one thousand pounds if well hand-packed, and in fine order. This concludes the almost ceaseless round of labor that is necessary to prepare for market this important staple of our country. It will be seen that I have endeavored to be as explicit and plain as possible, and have studied the greatest simplicity of style, supposing that to be the most suitable to the subject under consideration.

Planters in Maryland should grow less tobacco, and thereby improve its condition and quality. By that means they would require less house-room, fewer hands, less land, and receive more money for what was made. It is no uncommon occurrence for planters to fall short say 15 or 20,000 pounds in a large crop, yet receive more money for the residue than they got for the additional 20,000 lbs. the year before. The reason is, that *not being* pressed for room, it cured better, and they managed it better throughout its various stages, and consequently got a greatly increased price for it. That too is one reason why small crops invariably out-sell large crops, by several dollars per 100 lbs.; the other reason is, that small crops are rarely subject to drafts that must be met even if it be by forced sales. As a striking

instance of the uselessness of pursuing a practice of *overcropping*, which too many of the largest planters are constantly following to their great loss from year to year, and to the detriment of their neighbors by glutting the market with *trash*, I will mention a circumstance which made an impression on me the past year. Two gentlemen had each very fine crops of tobacco, so equal in appearance that there might be said to have been no difference in the product per acre as it stood, just when fit to top; but one had 220,000 hills, a small force in proportion to his crop, and scarce of room, having to haul some of it two miles to a neighbor's house. The other had only 160,000, plenty of room convenient to the tobacco ground, and a large number of hands to manage it. The latter gentleman made several thousand pounds more than the first, and it will average a larger sum per 100 lbs. taking the crop through. The reason is obvious, for in this crop every leaf was saved, none lost by worms, nor by "*house-burning*," (that is suffering, or even *rotting* from being hung too thick,) nor loss by distant transportation; nor by that unavoidable waste which is the sure accompaniment to hurry and over-work in the securing of any crop. To all these disadvantages and losses the other crop was subjected.

One word more, by way of advice to the planters, will not I hope be considered out of place here. *Never draw a draft upon the tobacco which you consign to your commission merchant.* Fix a value upon it yourselves, and refuse to take less for it than you think it worth, unless you are necessitated to sell, and then sell before it be known that you are compelled to sell. The chief rule of the *buyers* of tobacco is, I believe, in fixing the *price*, not founded upon the European demand, but the demands of the planters upon their merchants through the banks; and by that means the buyers are constantly kept advised of the necessities of the planters as individuals as well as a community, and they reduce the price of the article according to the urgency of the wants of the planters. I think it would be advisable, at least a safe *experiment*, for a sufficient number of the largest planters to establish an agency in some European market, and charter a vessel annually to take out their crops. The agent should be a practical planter, and be also an American citizen. His agency should cease at the farthest in five years, lest he become contaminated, and commence speculation on his own hook, as is too often the case with our commission merchants, who both buy for the *consumer* and sell for the *producer*, yet maintain their integrity, although no doubt it is sometimes inconvenient to the *conscientious*, who perhaps find it a stumbling-block in their religious pathway.

I conclude with expressing the hope that this humble essay may be favorably received by the planters of Maryland; and should any of the suggestions it contains be found of value hereafter to any individual, the highest gratification will be experienced by the author; and he will feel himself amply compensated for his labor and trouble, by the delightful reflection that he had contributed a small share to the advancement of the great planting interest, and thereby been of some use to his countrymen. [*American Farmer.*]

NICOTIANA TABACUM.

The following are the results of a series of experiments made by Messrs. Cooper and Brande, for the purpose of ascertaining the quantity of soluble matter in eight samples of tobacco, of detecting the presence and quantity of sugar contained in them, and the nature and relative proportions of their inorganic constituents. An important paper on the state in which *Nicotina* exists in tobacco, and on the relative proportion of it furnished by different varieties of the plant, has been furnished by Schlœssing, (Am. ch. et Ph. 3ieme Sér. XIX. 230.)

Tobacco dried at 212°.	Per cent. of extract, &c. soluble in water.	Per cent. of woody fibre, &c. insoluble in water.	Per cent. of ash after treatment with carbonate of ammonia.	Per cent. of matter soluble in water in the ash.	Per cent. of matter soluble in hydrochloric acid in the ash.	Per cent. of insoluble matter, as silica, &c. in the ash.	Per cent. of alcohol obtained from fermented infusion.	Per cent. of saccharine matter deduced from the obtained alcohol.
1. Light Missouri leaf and stalk	49	54.9	20.97 white	2.17	11.78	5.9		
2. Light Missouri leaf only	50	47.7	19.7 white	1.77	12.83	5.1	0.75	1.50
3. Dark Missouri leaf and stalk	50	52.4	16.47 white	4.2	10.14	2.18		
4. Dark Missouri leaf only	51	50.6	18.8 white	2.17	8.73	2.9	0.85	0.71
5. Light Virginia leaf and stalk	51.5	53.1	16.4 gray-white	2.53	8.54	5.83		
6. Light Virginia leaf only	54	46.1	11.97 green-gray	2.0	6.86	3.11	1.045	2.09
7. Dark Virginia leaf and stalk	48.5	51.8	14.7 gray	4.8	8.40	1.5		
8. Dark Virginia leaf only	52	49.8	12.58 gray	2.63	8.20	1.7	1.46	2.98

1. The samples were dried and the woody fibre and extract were also dried at 212°. The watery infusions of all contained ammoniacal salts. The salts from the ash which were soluble in water consisted of sulphates, carbonates, phosphates, and chlorides: the bases being potassa and lime. The solution by hydrochloric acid contained lime, alumina, phosphate of lime, and oxide of iron.

3. Contained oxide of manganese in small quantity; sulphates in watery solution of ash abundant. Hydrochloric solution contained an abundance of lime.

4. A trace of manganese; a trace only of phosphoric acid in watery solution.

5. Contained abundance of oxide of manganese.

6. Abundance of oxide of manganese.

7. A mere trace of oxide of manganese, and a trace of oxide of iron; only a trace of alumina.

8. A trace of oxide of manganese; quantity of oxide of iron very great; only a trace of alumina.

The following are the results of the analysis of the fresh leaves of tobacco by Passelt and Reinmann, (Mag. Phar. XXIV. and XXV.)

Nicotina	0.06
Nicotianine	0.01
Bitter extract	2.87
Gum	1.74
Gluten and albumen	1.31
Resin	0.27
Malic acid	0.51
Malate of ammonia	0.12
Sulphate of potassa	0.05
Chloride of potassium	0.06
Malate and nitrate of potassa	0.10
Phosphate of lime	0.17
Malate of lime	0.24
Silica	0.09
Lignine and trace of starch	4.97
Water	88.28
	100.85

CUBA TOBACCO.

Near Vicksburg, Mississippi, *December* 22, 1849.

Dear Sir:—I intended to send you a full account of our success in raising Cuba tobacco in this State, but absence from home, until too late for your Report, prevented me. There is a considerable quantity raised here, but it is in small lots of half to one acre, and all made into *Regalia* cigars, and sold in this State. They sell from $15 to $30 per M., the price depending principally on the care and attention given in the curing, &c. I have realized the latter price for mine the last two years. I pay five dollars per M. for making, and board the hand. A good hand will make from 200 to 250 per day, and boxes holding 100 cost 5 cents each. 100 lbs. tobacco will make about 4 thousand cigars. An acre will produce about 600 lbs. of this tobacco; it generally nets me, in this way, about one dollar per pound.

The crop in this State, I am confident, is not one-half that of last year, owing to the worm being worse than ever was known; and most persons raising it being cotton planters, who were all badly in the grass, the tobacco patch was neglected.

Owing to the causes above stated, it is impossible to form an estimate of the actual amount raised in the State, but I think the next census will cause many to open their eyes with astonishment.

If you have on hand any seed of choice kinds of tobacco, (especially *Persian*, the kind *Bengal cheroots* are made of, or *Brazilian*,) and will forward me a small quantity of each, I will esteem it a great favor, and send you an account of my experiment with them in time for your next Report.

Most respectfully yours, &c. R. Y. ROGERS.

Hon. Thomas Ewbank,

Commissioner of Patents.

CENTENNIAL HEMP.

(TRANSLATED FROM THE FRENCH, BY F. G. SKINNER.)

A foreign missionary, writing from China, thus describes a variety of hemp called Centennial: "I must now allude to a species of hemp growing in the district in which I am now travelling, between the degrees 31 and 34 north latitude. This hemp is called by the Chinese *tsin-ma*, or green hemp; it differs much from the *ho-ma*, which is the species in ordinary cultivation with us. The green hemp is not sown, but is planted, like sugar cane. The method pursued is this: after giving the land a thorough working towards the end of February, shoots are taken from an old *tsin-ma* bed and carefully set out, three inches deep and six inches apart; these shoots readily take root, and in about a month the stems begin to rise, and in forty days thereafter they attain a height of six or seven feet. The stem, hollow like that of ordinary hemp, is about half an inch in diameter. The leaf, heart-shaped, as large as the hand and very succulent, is green within, the outside being whitish and covered with down. Once well set and afterward well tended, a field will yield annual crops for *a hundred years*. The cultivation is simple: a manuring once in two or three years, and with the exception of December and January, a monthly hoeing is all that is required.

"This hemp is never pulled, but like sugar cane is cut as near the ground as possible; nor is it ever rotted or broken. Immediately after cutting, the bark is stripped from the stalks, commencing at the butt. This bark is composed of two parts: the first, which is green, is thrown away; the second is white, and constitutes the true hemp. The leaves remain upon the soil and serve to keep up its fertility; and the ligneous stems, after the removal of the bark, are made into matches.

"The *tsin-ma* yields three crops a year; the first in June, the second towards the last of August or the first of September. The third crop, which is of less value, is gathered in November. Immediately on the removal of one growth of stems, another springs up to replace it.

"This hemp is bought by the Canton merchants, and sells readily at from six to eight dollars per hundred. The quality of the green hemp is very superior to that of the *ho-ma* (common hemp); it is stronger, makes a better cloth, and sells higher.

"This hemp might be easily spun, and indeed it might be prepared in every way as ordinary hemp. The Chinese, however, do not spin the *tsin-ma*, preferring to weave it just as it comes from the plant. The ends of the filaments are united by a slight twist of the thumb and finger; it is then done into bundles and delivered to the weaver.

"I omitted to mention that the green hemp bore seed, but it is pretended that the plant cannot be propagated in that way. The *tsin-ma* is found growing wild on the mountains, and though used by the poor it is not near so valuable as when improved by cultivation.

"J. BERTRAND,

"*Apostolic Missionary, China.*"

Another variety of hemp from China is described by the French journals. It is now successfully cultivated in the south of France, attains a height of twenty-four feet, with a circumference of five inches, ripens its seed perfectly in the southern departments, and is called the *Lomacorchasus*.

SAVANNAH, ANDREW CO., MO., *October* 26, 1849.

SIR:—One of your circulars of July last having fallen into my hands, in accordance with your request I beg leave to offer the following as an accurate estimate of the cost of cultivating and preparing for market the product of one acre of dew-rotted hemp, it being the great staple of this section of country. In this county, Buchanan, Platte, Clinton, Holt, Nodaway, and Atchison, comprising the Platte country, hemp, Indian corn, hogs, and cattle are the only articles enumerated in your circular to which farmers pay much attention. Our soil and climate are well adapted to the growth and cultivation of each; but the first named, hemp, is now, and will in future be the great staple of the whole of north-western Missouri, as it will at all times pay a handsomer profit to the farmer than any other article that can be produced in a country so destitute of shipping facilities as the counties high up the Missouri river are.

The following estimate is made for one acre of hemp, and it is confidently believed it will not vary much from the actual cost of cultivating one or more acres, and will apply to any section of the hemp-growing country. Ten years ago I purchased the first lot of hemp grown in this county, but it was too small a lot to ship. It was then only raised for home consumption; it is now a great article of trade.

The average raised per acre is 800 lbs., which is worth to the producer at home, at $5 per cwt		$40.00
Cost of cultivating one acre:		
Rent of land	$2.00	
One and a fourth bushels of seed	0.94	
Seeding	3.00	
Cutting	3.00	
Shocking	0.50	
Spreading	0.50	
Taking up after rotted	0.50	
Breaking 800 weight	8.00	
Hauling to river	2.00	
		20.44
		$19.56

Thus leaving to the grower $19.56 per acre, after paying for all the labor attending the cultivation.

After this profit to the farmer, it falls into the hands of the merchant or buyer, who, after paying expenses to the St. Louis market, realizes as follows:

Paying for one ton on the bank of the river	$100.00
Baling ready for shipment, per ton	3.00
Storage	2.00
Freight to St. Louis	8.00

Insurance	1.80
Commission for selling	3.00
Weighing	.40
Drayage and storage at St. Louis one month	1.00
	$119.20

It is sold at $125, thus netting to the merchant $5.80. It may be proper to mention, however, that this calculation applies only to the operations in hemp of this year, and will likely be about the same for the next, (1850.)

This county is well adapted to wheat, but it does not pay as well. 30 to 40 bushels can be raised to the acre, and the crop scarcely ever fails, nor has it any enemies. The bearded red-chaff is preferred by almost every one.

We have a home market for cattle, horses, and mules, and but few find their way to the Southern markets.

Very respectfully,

G. W. SAMUEL.

Hon. THOMAS EWBANK,
Commissioner of Patents.

NEW MODE OF WATER-ROTTING HEMP.

[WE copy from the Louisville (Ky.) Democrat, the following letters on the subject of hemp culture in the United States, and would invite the attention of hemp-growers to the valuable suggestions therein contained.]

I take pleasure in communicating to the hemp-growers of the West the annexed paper from Mr. J. Anderson, of Louisville, Ky., pertaining to this highly important branch of our agriculture.

An active, ardent, intelligent mind has been devoted almost exclusively to this subject, in all its various bearings, for the last eight years; during which time a great number and variety of experiments have been made, constructing and re-constructing machinery of different sorts, and incurring a heavy outlay of money, not less than twenty-five thousand dollars, in making experiments only. At length he thinks he has attained the object so intensely sought for,—the true and right management of hemp, from the cutting to its being prepared for spinning.

In the course of his numerous experiments, he has constructed a milling machine, by which hemp is softened and refined to the requisite condition for the manufacture of fine fabrics. This machine he estimates very highly, as, by its use, common dew-rotted hemp may be cheaply and expeditiously prepared to make fine linen.

The advantages to be derived from the use of his brake are quite evident; they are very cheap, made mostly of cast iron, and of simple construction, costing less than one hundred and fifty dollars. A common horse-mill of two-horse power will be sufficient, with four hands, to clean a ton per day, as Mr. A. informs me. This enables the farmer to get his crop to market in the fall, instead of the spring, as this brake will completely clean hemp in a half-rotted state, producing a much better article, and increasing the yield sixteen to twenty per cent. in weight of lint.

His process of water-rotting has also the great advantage of getting the crop early to market. It produces a very superior article, having a rich, oily, lively appearance, from which can be made as strong and as durable cordage as can be made from any hemp whatever; the durability is insured from the fact, that the albumen is effectually cured by the natural heat generated in the mass in bulk.

The Navy of the United States will probably consume eight hundred tons of water-rotted hemp a year. Not a half has, as yet, been produced at home. All this hemp, in the course of a few years, will be manufactured into suitable cordage for the navy of the nation, at Memphis, in Tenn., where the government has established, and nearly completed, the best and most perfect rope-walk ever built.

The various manufactories and the general commerce of the country consume more hemp than has heretofore been produced. An increased production will be required to supply our wants, and if the quality is improved, as Mr. Anderson anticipates, the quantity may be indefinitely increased. After supplying ourselves—that is, the national navy, manufactories, and our own shipping—we then have the markets of the world for the surplus.

I am informed that good Russian hemp cannot be imported for a less sum than two hundred and twenty dollars per ton.

I respectfully call the attention of hemp-growers to Mr. Anderson's improvements.

LEWIS SANDERS.

LOUISVILLE, *April* 3, 1849.

MR. LEWIS SANDERS, *U. S. Hemp Agent.*

SIR:—Knowing your anxiety to further the progress of the hemp interest of the Western States, it has occurred to me to address a few remarks to you on that subject, derived from my own experience, from a series of experiments for the past eight years.

1st. In relation to the dew-rotted hemp. It has been, and still is, the practice of hemp-growers to allow their hemp (after spreading in the fall of the year) to remain exposed to the action of the atmosphere until a decomposition of the fibre has progressed so far as to enable them to break it with facility on the hand-brake; the quality is thereby rendered unequal, the original strength much impaired, its texture destroyed, and its weight much reduced. In consequence of the undue exposure of this article to the blighting influence of the atmosphere, a decomposition of the fibre has commenced, and its destruction is accordingly hastened, whenever exposed to ordinary heat and moisture; hence its want of durability, in comparison with water-rotted hemp.

This defect in the great staple of the West can be obviated, and will be, in the progress of time; it might be obviated at once by pursuing a better and more economical process than that heretofore observed.

Let the hemp remain in the swath, on the field where it grew and was cut; a few rains will suffice to cure it for the brake; or after sufficient exposure to the sun, it may be stacked for fall spreading; when, after a few rains, or when half-rotted, it may be shocked, preparatory to breaking. Either of these processes would be at present objected to by the practical farmer in consequence, as he would say, of the impossibility of breaking and cleaning it. The mind of the farmer is of course directed to the hand-brake, (when he arrives at that conclusion,) while mine is directed to my improved roller hemp mill, now in successful operation near this city. By the aid of this new and simple machine, hemp, half-rotted, can be broken with great rapidity; it does not impair the quality or strength of the fibre, but has a tendency to loosen the wood, by a milling process. When the wood is so severed, it is an easy matter for one hand to clean 500 to 600 pounds per day, on the hand-brake; either by scutching, or by whipping and shaking. The quality of the article so produced is bright, soft, and lustrous.

2d. In relation to water-rotting hemp. The method adopted by farmers is to allow the hemp to remain immersed in water until the glutinous matter is completely dissolved; the consequence is a considerable impairing of the strength of the fibre: for a complete solution of the gummy matter could not take place without fermentation, and fermentation is the beginning of decay. I am aware that farmers are forced to this alternative to enable them to break and clean on the hemp-brake; but hereafter they should produce a stronger and more durable article, and thereby not only supersede the Russian hemp, but become exporters of the article to all parts of Europe. To produce an article of hemp suited to the consumption of the Navy Department, it is only necessary to immerse the hemp for a period of twenty-four hours, then withdraw the water, and let the hemp remain in bulk until the generation of natural heat takes place; that will be observed in the course of ten or twenty hours after a thorough impregnation by the heat; then inundate a second time, and let it remain until you are prepared for its convenient removal. It may, after the process of heating, remain in the water for months without any disposition towards fermentation; and surely, if it does not ferment in the water, there is no danger of its doing so in cordage.

With the aid of the improved milling machine, I am sure that a good hand could clean 500 pounds per day on the hand-brake, hemp prepared as above. Hemp so prepared is remarkable for its weight and oily appearance, and just the article that would make the superintendent of the United States rope-walk exclaim, "America can beat the world."

I am, truly, your friend,

JAMES ANDERSON.

VI.

MISCELLANEOUS COMMUNICATIONS.

EXPLANATION OF PLATE 2.

Fig. 1. A grain of wheat opened to show the cavity in which the caterpillar of *Tinea granella* had fed, with the excrement at the apex.
Fig. 2. Several grains united by the same caterpillar.
Fig. 3. The caterpillar of *Tinea granella*.
Fig. 4.* The same magnified.
Fig. 5. A group of the cocoons spun by the same.
Fig. 6. The *chrysalis* taken out of a cocoon.
Fig. 7.* The same magnified.
Fig. 8. A *chrysalis* sticking in a cocoon after the moth was hatched.
Fig. 9. *Tinea granella* at rest.
Fig. 10.* The same flying and magnified.
q. The natural dimensions.
Fig. 11. *Calandra oryzæ*, the rice-weevil.
Fig. 12.* The same magnified.
*a.** One of the mandibles or jaws.
*b.** The maxilla.
*c.** The palpus or feeler.
*d.** The antenna or horn.
Fig. 13. A grain of wheat opened to show the burrows of two beetles.
Fig. 14.* The same magnified.
e. The maggot of *Calandra oryzæ*.
p. The burrow of *Cucujus testaceus*.
Fig. 15. A grain of wheat.
f. The hole eaten by the *larva* of *Calandra oryzæ*.
Fig. 16.* The same grain magnified.
f. The hole perforated by the little maggot.
Fig. 17.* The grain of wheat opened to show the perfect weevil inside.
Fig. 18.* The *pupa* of *Calandra oryzæ*.
g. The natural size.
Fig. 19.* The parasitic fly, *Meraporus graminicola*.
h. The natural size.
Fig. 20. *Calandra granaria*, the granary weevil.
Fig. 21.* The same magnified.
Fig. 22.* *Larva* of *Silvanus Surinamensis*.
i. The natural length.
Fig. 23.* *Pupa* of the same.
j. The natural length.
Fig. 24.* *Silvanus Surinamensis*.
k. The natural length

Fig. 25.* *Larva* of *Cucujus testaceus*.
l. The natural dimensions.
Fig. 26.* *Cucujus testaceus*.
m. The natural size.
Fig. 27.* *Cadelle* or *Larva* of *Trogosita Mauritanica*.
n. The natural length.
Fig. 28.* *Trogosita Mauritanica*.
o. The natural length.

Obs.—Those numbers and letters with a * attached refer to the objects which are represented larger than life.

OBSERVATIONS ON VARIOUS INSECTS AFFECTING GRAIN.

(Condensed from Journal of Royal Agricultural Society.*)

Tinea granella.—(The wolf, or little grain moth.) (Plate 2, figs. 9 and 10.) This moth is completely established in this country as well as in every part of Europe. It is called in English works "The mottled woolen moth," and has received the scientific appellation of *Tinea granella*. The caterpillars do incredible mischief to bonded and housed corn laid up in granaries, and they are, I believe, called "White corn-worms." From April till August the little moth is found in granaries and magazines, resting by day on the walls and beams, and flying about only at night unless disturbed. Soon after they have escaped from the chrysalis the sexes pair, and the female lays one or two eggs on each grain of corn until she has deposited thirty or more; they are so minute that they can only be detected by a good magnifying glass, when they appear of an oval form and of a yellowish-white color.

The small white worms hatch in a few days, and immediately penetrate the grain, carefully closing up the aperture with their roundish white excrement, which is held together by a fine web. (Pl. 2, fig. 1.) When a single grain is not sufficient for its nourishment, the larva unites a second grain to the first by the same web, and thus ultimately adds together a great number, (fig. 2,) forming a secure habitation, which at the same time is well stored with provisions. When the maggots are almost full-grown, they often leave their lodgings in great numbers, running over the grain and covering the whole surface so effectually with a thick web of a grayish-white color, that scarcely a grain of corn is visible. In August or September the caterpillars arrive at maturity, when they leave the corn heaps and search for a safe and suitable place to undergo their metamorphosis, and at this period they are most observed. They form their cocoons (fig. 5) by gnawing the wood and working it up into their web, in any chink in the floor, walls, or roof, which are frequently swarming with them, and these cocoons, being of the form and size of a grain of corn, look like one dusted over. It there remains in its snug and warm berth in the larva state through the winter, and does not change to a chrysalis until the month of March following, and in a backward spring not until May. The pupa (fig. 6) is of a deep

* Observations on the Natural History and Economy of various Insects affecting the corn-crops in the field and granary, including Moths, Weevils, and other Beetles, &c.—By John Curtis, F. L. S. &c.

chestnut color, the abdominal rings being of a shining yellow tint, and the apex is furnished with two little points, (fig. 7, the same magnified.) In two or three weeks after they have assumed the pupa form the moth hatches, with almost perfect wings at its birth, I have heard, leaving the empty chrysalis sticking half out of the cocoon, (fig. 8.)

It is difficult to guard against the introduction of this moth, since it deposits its eggs on the sheaves in the field, as well as after the grain is stored and threshed out, and will feed as freely upon barley, rye, and oats, as upon wheat. It is, however, not difficult to suggest palliatives, if not remedies, and if the following rules are strictly observed, few persons will suffer from the inroads of this insect:—

1st. Before replenishing an empty granary or loft, the floor should be well scoured with hot water and soft-soap or lees if practicable; if not, it must be well brushed with a fine stiff broom, to clean out the chinks or fissures between the boards. The roof and beams should be whitewashed, as well as the walls, with lime-water used as hot as possible; and these operations would have greater effect if performed in the winter months. Sprinkling the floor with salt dissolved in strong vinegar has been recommended, and might be very serviceable.

2dly. In granaries already stored, where the caterpillars are at work, whatever method for their destruction is resorted to by heat, ventilation, or otherwise, it must be employed during the summer from the end of May to the end of August, occasionally a month earlier or later, as during the winter these larvæ are not to be found among the corn heaps; they retire in the autumn to conceal themselves in fissures and cracks in the floors and walls, and form their cocoons.

3dly. The moths themselves may be destroyed in spring by burning lamps or gas lights in dark granaries; they being attracted by the flame, fly into it, and are sufficiently injured to prevent their doing further mischief; and at the same season the grain should be frequently turned over to destroy the eggs and disturb the young larvæ. All cracks and broken places in the walls and roof should be stopped with plaster of Paris, or cement, and the apertures for ventilation should be covered with a wire gauze.

Kiln-drying at about 78° Fahrenheit will kill the larvæ when they are feeding. *Cold currents of air*, introduced by small windows near the floor, thus keeping up an artificial cold atmosphere, are very effectual. *Burning sulphur* and creating sulphuric acid in a close apartment will kill the moths.

A small heap of grain left undisturbed, frequently turning over the rest, is a sure and simple plan of catching the larvæ, where they can easily be destroyed by pouring on boiling water.

When diseased grain is used for seed, it should be sown deep to prevent the moths from escaping through the soil. It is also desirable to cut the grain in good season, for if it is suffered to remain too long in the field the moths are enabled to lay their eggs in the ears, and are thus introduced into the barn.

CORN OR GRAIN WEEVILS.

From the numerous statements and complaints that have been transmitted to me, I am inclined to believe that no insect does more mischief to stored grain than these weevils, of which there are two species. One is called by Linnæus *Calandra oryzæ*, the rice-weevil, (Plate 2, figs. 11 and 12.) It is frequently found among rice, and is supposed to have been originally imported from the East Indies in that important article of food. I have seen it infesting wheat from Ancona, sent to Mark Lane for sale in 1844, and from various granaries. Prof. Royle also transmitted me specimens which were destroying East Indian wheat in the ships by which it was brought over to this country.

The other species of corn-weevil alluded to, called *Calandra granaria*, the granary-weevil, (Plate 2, figs. 20 and 21,) is more common in this country. No insect is more formidable to man than this little pest, since it attacks the principal basis of his food; and they are sometimes so numerous in a heap of grain as to destroy it altogether, leaving nothing but the chaff. The sexes pair as soon as the weather becomes sufficiently warm in spring, and the female makes a little hole in the grain of wheat with her rostrum, and deposits an egg in it, from whence is hatched a little maggot, which during its growth consumes the entire contents of the grain, and eventually becoming a perfect beetle, eats its way out. From the moment of pairing until the time when the weevil is hatched occupies about 40 or 45 days, from which it is evident that there are many generations in a year, and they multiply much more rapidly in a hot country. From a very curious table, established upon the multiplication of the weevils, by adding together the number of each generation, the result obtained is the sum total of 6,045 individuals proceeding from one pair only during the five months from the 15th April to the 15th September. As Olivier says: "One cannot be any longer astonished that enormous heaps of corn are sometimes so speedily devoured." The holes formed by the female, in which her eggs are laid, are not perpendicular to the surface of the grains, but oblique or even parallel, and stopped with a kind of gluten of the same color as the corn. The female never lays more than one egg in each grain, which is not long in hatching, and when lodged in the grain is perfectly secure from changes in the atmosphere, because the excrement that it makes seems to close the opening by which it entered, and even when the corn is removed it is not incommoded by any shaking it may undergo.

It will be observed that the weevils are not found on the surface, but some inches deep in the corn-heaps; it is there that they live, very often couple, and that the females lay their eggs. Moreover, on looking at a heap of corn, one cannot detect the operations of these insects in the grains where they are lodged; they have the same form, the same appearance, they seem to be as large and as firm as those which are not attacked. It is only by the weight that they can be detected, and on throwing a handful from a heap into water, the diseased grains will float.

So long as the weather remains hot the weevils do not quit the corn-heaps they have invaded, unless they are obliged to abandon them by stirring the corn with shovels or passing it through a sieve. When the mornings begin to be cool, all the weevils, young and old, abandon the corn-heaps which are, no longer a retreat sufficiently warm for them; they retire into the crevices of the walls, into the cracks in wood and planks, wherever they can find a safe abode that secures them from the cold, which makes them desert the grain heaps.

It is, however, wrong to suppose that the weevils remain in a torpid state during the whole winter, to regain on the return of spring the grain heaps which they have abandoned, and to recommence laying eggs there. A general and constant rule among insects is, that those which have paired die soon afterwards, the males almost immediately, the females as soon as

they have performed their office of laying the eggs, and that they pass the winter in the egg or larva state. It is undoubtedly seldom that those which have not fulfilled the destiny of nature can brave the rigor of the season, and do not perish before the ensuing spring. The weevils seem to love darkness, and to remain undisturbed, since, when they are exposed to the daylight, they scamper off to conceal themselves. Such is Olivier's account.

So important is this subject, that a variety of remedies have been successively proposed for many years, which I shall now consider; and although some of them may appear trifling, they will not only show how far advanced we are above our ancestors in such knowledge, but they may chance to elicit better modes of application, and even to suggest new ideas. We first hear of fumigation with herbs having a strong and disagreeable odor; but this seems to have been useless, as the weevils, by burying themselves among the grain, are by no means incommoded, while the corn has suffered from fetid and disgusting scents which have been communicated to it. It is even asserted that the scent of spirits of turpentine appeared to cause the weevils no inconvenience; but I think if it had been persevered in for several consecutive days, excluding at the same time ingress of air, that they must have been destroyed. The fumes of sulphur are said to be equally inefficient; and all these fumigations are still less adapted to destroy the larvæ, as the smoke cannot penetrate among the grain.

Olivier says: "Experiments have proved, that a sudden heat of about 75° Fahrenheit is sufficient to destroy the weevils without burning them, but this would not suffocate the insects when they are buried in a heap of corn. It has been observed that a heat of 167° or 190° Fahr. is necessary to kill the weevils in the stove; but this excessive heat, which also destroys the eggs and larvæ inclosed in the grain, is capable of drying the corn too much, even of burning it, and yet does not preserve it from the insects secreted in the granary, which will come out and attack it, if there be no other for them."

Mr. Mills, in a communication to the "Entomological Transactions," says: "A gentleman of the name of Wilkinson, in Madeira, has now established a heated room with hot-water pipes, in which he receives as many as 800 bags of wheat at a time; these become heated through at about 185°, and the wheat when resifted is perfectly cleansed from these noxious insects, and makes quite as good bread as before. I also tried some of it in the ground that had been subjected to this heat, and it came up."

Ventilation and the introduction of currents of cold air is highly recommended, and also the forming of little heaps of grain in the spring to act as decoys, which has already been suggested among the remedies for the "little grain-moth."

In a French work, we are told it is an excellent plan "to lay fleeces of wool which have not been scoured, on the grain; the oily matter attracts the insects among the wool, where they soon die, from what cause is not exactly known."

After all that has been said, I shall revert to the necessity of keeping granaries clean and aired, and by turning over the grain frequently, and taking every opportunity of whitewashing the walls when the granary is empty, much loss from these insects will be avoided.

Silvanus Surinamensis—Linn. (The corn silvanus.) (Pl. 2, figs. 22, 23, and 24.) From the specific name it may be inferred that this little beetle has been originally imported from Surinam. It is now a constant inhabitant of our stores and warehouses, and from its infesting corn, it was described by Fabricius as *Anobium frumentarium*, and subsequently as *Dermestes sex-dentatum*, from the spines on the side of its thorax. Linnæus' name, however, has the priority. This insect appears to be spread all over the habitable globe, probably carried in vessels with grain and dried fruits.

Cucujus testaceus. (The corn cucujus.) (Pl. 2, figs. 25 and 26.) This is a still smaller beetle which accompanies the corn-weevils, and has been found in great abundance in a granary in Cambridge, by Mr. C. C. Babington. This is decidedly a corn-feeding insect, and in examining the wheat from Ancona, and cutting open the grains, I found two with the cucujus in them, as shown by the cavity at the top of fig. 13, and more distinctly exhibited at fig. 14, *p*; in this cell, which is opposite to the point occupied by the corn-weevil, the *cucujus* was lying dead, and there were two or three little holes in the skin of the wheat as minute as the point of a needle. This insect was named by Fabricius from its color.

Trogosita Mauritanica. (The cadelle.) (Pl. 2, figs. 27 and 28.) This beetle has been introduced from the shores of Africa, in which country it is abundant as well as in America, and has now spread itself over a great part of Europe, so that it is common in the south of France in the larva state, and makes great havoc among the corn in granaries; it also attacks dead trees, and even bread and nuts. The larvæ are called *Cadelle* in the south of France, and they are particularly destructive, because they eat the outside of the grain, and passing from one to another, they injure as much or more than they consume.

The beetle is carnivorous, and makes some amends for the mischief it had done in its larva state by destroying the *tinea granella*; it is not yet known where the female deposits its eggs.

W. P. F.

EXPLANATION OF PLATE 3.

Fig. 17. Part of a broad bean in flower.
Fig. 18. A humble-bee named *Bombus terrestris*.
k. The cavity bitten by the humble-bee.
Fig. 19.* The proboscis or mouth of the humble-bee.
u. The mandibles.
m. The maxillæ.
n. The labial palpi.
o. The tongue.
Fig. 20. The bean-louse, black dolphin, or collier, *Aphis Fabæ*.
Fig. 21.* The same magnified.
Fig. 22.* A winged male ditto.
Fig. 23. The natural size.
Fig. 24. Outside of a Sicilian bean infested with *Bruchus flavimanus*.
p. A spot beneath which lies the pupa or beetle.
q. A hole eaten by the inclosed beetle.
Fig. 25. The same bean split, showing the inside.
r. The maggot of the *Bruchus* in the cell.
s. A pupa in the cell.
Fig. 26.* The maggot taken out and magnified.
Fig. 27.* The pupa magnified.
Fig. 28. A Russian bean infested by *Bruchus granarius*.
Fig. 29. A horse-bean first eaten by *Bruchus granarius*, and afterwards by the maggots of a little moth, as shown at *u*.
Fig. 30. A smaller bean containing *Bruchus granarius*.
v. The pupa in a cell.
Fig. 31. *Bruchus granarius* walking, in outline.
Fig. 32.* The same magnified.
Fig. 33. A pea infested by *Bruchus Pisi*.
w. The head of the beetle thrust out.
Fig. 34.* *Bruchus Pisi* magnified.
Fig. 35. The natural length.
Fig. 36. Portion of a sack matted together by *Tinea sarcitella*.
x. The maggots in their cells.
y. The pupæ, ditto.
Fig. 37. Outline of the caterpillar, full grown.
Fig. 38.* The same magnified.
Fig. 39. Cell or cocoon containing the chrysalis.
Fig. 40.* The chrysalis or pupa magnified.
Fig. 41. *Tinea sarcitella* at rest.
Fig. 42.* The same moth flying and magnified.

OBS.—Those numbers with a * attached refer to the objects which are represented larger than life.

OBSERVATIONS ON VARIOUS INSECTS AFFECTING PEAS AND BEANS.*

Bombus terrestris, (the *Humble-bee.*) It is a well-established fact that bees are exceedingly serviceable in rendering flowers prolific; but it is not so generally known that many are greatly injured by them, and few farmers are probably aware that humble-bees in some seasons deprive them of a very large proportion of their crop of beans, by puncturing the base of the flowers, and rendering the incipient pod entirely or partially abortive. Many garden flowers are similarly attacked by bees, as *larkspurs, azaleas, fuchsias, salvias, snap-dragons*, &c.

The cause of the humble-bees thus damaging the crop of beans and flowers arises possibly from some unusually large females—for individuals of the same species vary greatly in size—not being able to creep into many flowers that are too small to admit of their bodies, and too long to allow of their reaching the nectary with their tongues; they are not, however, to be thus balked of their feast, and instinct directs them to the exact spot on the calyx beneath which the nectar is stored, (Pl. 3, fig. 17, *k*;) these they nibble with their strong jaws, (fig. 19,) until they are enabled to introduce their proboscis (figs. 18 and 19) and obtain the desired treasure. The orifice is invariably on the upper side of the calyx, and near the centre, or a little towards the base: the incision passes through the calyx as well as the upper lobe of the flower into the nectary containing the honey, which proves a great detriment to the crop, for the punctured flowers cannot perfect all the beans in the seed-vessel, or the pod proves altogether abortive.†

Humble-bees form their nests in old loose walls, among broken bricks and stones shot down as rubbish, in banks, at the roots of trees, &c. During the first days of spring, or even earlier, the females come forth to collect honey and pollen, from the blossoms of the willow. In the summer, humble-bees may be seen gathering moss, for the purpose of covering their nests, which are sometimes lined with wax. If it be desirable to stop the mischief caused by these insects, the nests must be destroyed at the end of summer, and the females collected as they come out in spring. They have, however, many natural enemies among the feathered tribes, especially the butcher-bird, *Lanius colluris*, which impales them on thorns—also a fly called *Volucella inanis*, which deposits its eggs in the humble-bees' nests, and the larvæ live on the brood of bees.

Aphides, or Plant-lice.—Another tribe of insects which destroy or injure the peas and beans, are the Aphides, from which no crop is entirely free; the former of these plants are often smothered with *lice*, or *green-dolphin*, as they are termed, and the latter seldom escape the attacks of another species, which, from their sooty color, are called the *black-flies, black-dolphins*, or *colliers*. Like all the insects of this family, their appearance is very sudden, and their increase so prodigious, that crops suffer severely

* See Journal of Royal Agricultural Society, vol. vii. p. 404.
† Gardener's Chronicle, vol. i. p. 485

from their visits. In 1833, the beans were almost totally destroyed by them in Yorkshire, England.*

Mr. Dickson says: "In such summers as are dry, beans are frequently liable to be much injured by the attacks of the *black-fly*, or what is often termed the *dolphin*; the whole field in particular cases being in danger of being destroyed in the course of a few days. In order to prevent this mischief, it is the practice in some places to cut off the tops by means of a scythe or other sharp implement, as it is mostly on the tops of the plants that the insect first appears. When this method is adopted, it should be performed on their first appearance, otherwise little benefit can be produced; as perhaps by removing the first insects that show themselves, their propagation may in some degree be prevented."†

The *Aphides* exhaust the plants by sucking the sap, so that when they abound it is vain to calculate upon a good crop, if they are not speedily arrested. The beans should be topped on their first appearance, and the tops collected and burnt. The larvæ of the Lady-bird, and the maggots of flies and of minute *ichneumons*, soon come to the aid of the farmer, and destroy immense quantities of these plant-lice; and where these agents are known to be numerous, the destruction of this class of noxious insects may safely be intrusted to their instinct.

BRUCHIDÆ, (the pea and bean beetles.) Peas and beans are often inoculated in the field by a group of beetles, called improperly "bugs" by farmers; and this subjects them, like the cereal crops, to great injury and waste after being stacked or housed. From their destructive nibbling propensities, these beetles have received the name of *Bruchus;* of these there are several species: among them the *Bruchus granarius*, or grain bruchus, (Pl. 3, figs. 31 and 32,) and the *Bruchus flavimanus*, which is somewhat larger than the former. Both these infest beans to a limited extent in this country; but the most common, as well as the most destructive species is the *Bruchus Pisi*, or "pea-bug," as it is commonly called, (figs. 34 and 35.) This insect is a species of beetle well known to farmers. In some parts of this country and Europe, it has made such ravages among peas, as to compel the inhabitants wholly to abandon the culture of this crop. Like the Hessian fly and the grain-weevil of Europe, it was introduced into this country in seed imported from abroad.

As the economy and habits of these insects have been well investigated, I will relate what has been published concerning them.‡ Early in summer, when the peas are in flower and forming pods, the female beetle deposits an egg in almost every pea. When matured, the pea does not appear injured, but on close examination we can discover in each a minute black speck, which is the *larva*. Dr. Harris says: "The eggs are laid only during the night, or in cloudy weather. Each egg is placed opposite the pea, and the holes through which they pass are so fine as scarcely to be seen, and are soon closed." The larva remains in the pea all winter, gradually consuming its internal substance, and in spring it is transformed into a perfect insect, pierces the skin, and emerges to deposit its eggs in the new pods. The larva has a soft whitish body, and a head small, scaly, and armed with strong and sharp cutting mandibles. The maggot, when it reaches maturity

* Journal of Royal Agricultural Society, vol. vii. p. 416.
† Dickson's Practical Agriculture, vol. ii. p. 597.
‡ Observations on the Natural History and Economy of Insects, &c., by John Curtis F. L. S., published in Journal of Royal Agricultural Society of England.

gnaws a circular hole to the husk or skin of the pea, and even cuts round the inner surface which covers the aperture; so that, when changed to a beetle, by a slight dilation of its body it forces off the lid, and emerges the the new-born *Bruchus*, as represented in fig. 33. In many of the peas the insect will be found dead. Whether this arises from a lower temperature than they are accustomed to, not invigorating them sufficiently to leave their habitations, or whether they return to feed when they cannot make their escape readily, which is the case when the peas are confined in sacks, or heaped up in a warehouse, has not been determined.

The vitality of the seed is not usually destroyed; as the egg is deposited in the side of the pea, where the insect when hatched emerges, leaving the germ uninjured. It is doubtful, however, whether the plants raised from such peas are as strong and healthy as those from perfect seed: and they should therefore never be used for seed when it can be avoided.

This insect, though common in all the older States, is almost wholly unknown in Canada, owing perhaps to its not being able to withstand the severity of a Canadian winter. Hence thousands of bushels of peas are annually brought from Canada to the United States for seed.

Remedies and Preventives.—Late sowing has often proved a successful preventive against the ravages of the pea-bug. If sown the last of May or first of June, the peas will not blossom or form their pods until after the beetles have disappeared. But peas sown so late often suffer from the drought, and rarely yield a very abundant crop. It is recommended in *Hovey's Magazine* to subject the peas immediately after they are gathered to the action of boiling water for *one minute;* by this means the larvæ are destroyed, which are at this time just below the integuments of the pea, without affecting the vitality of the seeds. If the peas remain in the boiling water *four minutes*, most of them will be killed. To kiln-dry the peas at a heat of 130° to 140° will answer the same purpose, and does not destroy the germ. When they are intended for culinary purposes, some such means should be taken to destroy the larvæ, as instances are given by French writers where persons have been *poisoned* from eating worm-eaten peas, containing the maggots and beetles of the *Bruchus Pisi*.

Tinea sarcitella, (the sack or woolen moth.) (Pl. 3, figs. 41 and 42.) The economy of this little insect is somewhat like the grain-moth, as its larvæ feed indiscriminately on vegetable and animal substances. It frequently assists in the destruction of peas and beans when housed, which were previously infested by the *Bruchus Pisi*.

Peas, when stored in sacks or bags, if not thoroughly dry, often breed these moths, which cement the sacks so strongly together as in some instances to require the strength of two men to separate them.*

The *tinea sarcitella* has long been known as a most mischievous little moth in our dwelling-houses, where it is common the greater portion of the spring, summer, and autumn. The female deposits her eggs upon clothes, blankets, curtains, carpets, or any woolen articles upon which the larvæ feed, living in cylindrical cases, which they form of the materials on which they subsist, and in which they change into pupæ, (fig. 40:) the caterpillar is about half an inch long when full fed, (figs. 37 and 38:) it is soft and white, and a lively little animal, sparingly covered with fine, longish hairs.

The mischief done to peas and beans, which are rendered useless and

* Jour. Roy. Agr. Soc. vol. vii. p. 458.

very offensive by the webs and excrements of these caterpillars, is principally owing to their being housed in a damp state. It is therefore necessary to keep the places where peas or other seeds are stored as dry and well-ventilated as possible. It is also found very beneficial to air in the sun or kiln-dry the sacks, to destroy the innumerable mites, insects, and vermin which often infest them; and if sacks were thus kept sweet and clean, and were only manufactured of hemp, or vegetable thread, they would never be infested by the *tinea sarcitella*. These insects, like all others, may be destroyed by fumigating with sulphur, or by allowing spirits of turpentine poured into saucers to evaporate in the infested places. When small quantities of seeds are required to be kept in bags or drawers, they will be preserved from insects if well dusted with pepper, or a few ounces of camphor will be found to answer the same purpose. W. P. F.

IRRIGATION.

(*Translated principally from the "Journal d'Agriculture pratique."*)

BY F. G. SKINNER.

That the yield of a crop is generally in proportion to the quantity of manure applied to it, and that profit does not depend so much upon extent of surface cultivated as upon manure and good tillage, are agricultural axioms, the natural deduction from which is, that a small, well-cultivated, and heavily manured farm, will return a greater net revenue than a much larger one, with the same expenditure in labor and manure spread over a larger surface: and of this fact, we are surrounded by proofs on every side. In all the older States, under an improved system of tillage and manuring, we find mere fractions of what were once large estates, yielding not only greater proportional profits, but actually larger aggregate returns, than did the original estates of four or five times the extent of surface.

Manure is the chief source of agricultural prosperity; by its means bad land is converted into good, and the most barren wastes compelled to yield the richest products. Of all known manures, none are of such value and importance as those from the stable and cattle-yard; for these are adapted to a greater number of locations and variety of soils, and to all plants, and modes of cultivation. True, substances are frequently used as fertilizers, much more energetic than ordinary farm-yard manure; but it is only to *supply a deficiency of the latter, or to increase its action.* These fertilizers are not to be had in sufficient quantity, nor is their transportation so easy, as to dispense with the necessity for stable manure, without which the highest degree of productiveness is never attained, and without which in most cases agriculture would become an unprofitable pursuit.

As the productiveness of a farm or crop depends less upon the extent cultivated than upon the mode of cultivation and the amount of manure applied, so does the quantity of manure made depend less upon the number of animals fed than upon the amount and quality of food consumed; and in relation to manure, cattle are only to be looked upon as machines for the conversion of forage and other food into that substance. A part of the forage being assimilated by the animals for their sustenance and the remainder voided in the form of manure, the value of which mainly depends

upon the richness of the food; for it is well known that the droppings of a lean ill-fed beast are inferior in quantity and quality to those from a fat one. It may, therefore, be assumed as a maxim, that the prosperity of a farm depends chiefly upon the amount of food consumed upon it; and in general, the amount of hay made upon an estate is a safe indication of its condition, and an increasing production of forage is a sure sign of agricultural improvement.

As a means of producing food for stock, *irrigation*, whenever tried, takes precedence of every other, and the chief reason is, that instead of *consuming, it produces manure.*

The process of irrigation has invariably, wherever carried out, proved of almost incalculable value, and there are, probably, few countries that would derive greater benefits from its general introduction than the United States. Indeed, there are large portions of our recently acquired territories in New Mexico and California that must ever remain barren wastes without it.

A bounteous Providence, in giving water to the cultivator, furnished him the means of increasing his crops to an almost indefinite extent; for by means of irrigation, this simple element, poured out in most places in such abundant profusion, becomes the "kindling instrument of life and energy to the vegetable world." Water is indispensable to the perfect development of plants, for its elements enter into the composition of all of them. Not only does it enter chemically into their organization, but it also holds in solution foreign matter which serves them as manure, and which is either deposited or rendered of easy assimilation: thus from 75 to 95 per cent. of nearly all green plants consists of this element. Almost all spring waters contain carbonic acid, and frequently sulphur, lime, and a variety of salts, a greater part, if not all of which, being decomposed and absorbed by the plants, contribute greatly to their development.*

Rivers, small streams, and most spring brooks carry with them minute particles of earth which are deposited in the form of a rich mud or slime. Rain-water too, flowing over roads and fields, becomes charged with fertilizing principles, which are carried into the rivers, and finally lost in the ocean, if they are not arrested in their course by the skill of the cultivator, and applied as manure to his fields. The soils thus swept away form a mass of which it is difficult to form a conception, and continual changes are

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* The following analyses, by Professor Johnston, exhibit the composition of the waters of four different rivers:

	Alc.	Eye.	Riglaw.	Wear.
Organic matter	1.75	1.64	2.58	0.92
Potash in the state of sulphate	1.68	0.80	0.72	} 1.50
Soda and chlorides	....	0.44	1.94	
Gypsum, (sulphate of lime,)	0.64	1.46	2.94	0.88
Carbonate of lime	5.28	8.48	7.32	7.92
Carbonate of magnesia	1.00	1.24	1.64	2.04
Chloride of magnesium	1.82	0.80	1.25	
Oxide of iron	0.56	0.48	0.60	0.56
Sulphuric acid	1.44	0.98	1.80	0.96
Chlorine	0.86	0.70	1.65	1.10
Silica	0.24	0.08	0.32	1.20
	14.77	12.10	24.76	17.08

being made upon the earth's surface by the constant but imperceptible action of water upon mountains and hills. It is calculated by Rinnel, that the hourly deposit of mud at the mouth of the Ganges amounts to 2,509,056,000 cubic feet, at the mouth of the Nile to 14,784,000, and at that of the Mississippi to 800,000. Few rivers, indeed, carry with them such enormous quantities of mud as the Ganges, the Nile, or the Mississippi, but all of them, nevertheless, sweep away to the ocean more or less of fertile soil of value to agriculture, and thus produce changes upon the surface of the globe, by which future generations may profit, it is true, but at the expense of our own. Mountains and hills are constantly washed by rains, all their fertile parts are carried off, and they finally become naked masses of barren rock if nature has not heaped upon them an inexhaustible supply of vegetable earth, or if the losses are not repaired or prevented by skillful management. Soils at the mouths of rivers, of recent formation, are the sources of malaria and other unhealthy emanations highly prejudicial to animal life. While nature by her vast combinations thus prepares fertile fields for generations to come, she does not forbid the exercise of man's ingenuity to compel the spendthrift waters to pay a passing tribute of fertility to his wasting fields. By covering the mountain slopes and hill sides with grass, and turning aside the streams for its irrigation, agriculture may diminish a portion of the evil, and profit by that which it cannot prevent.

In northern climates, irrigation so far, has only been applied to meadows, and but little, if at all, to cultivated or ploughed lands. At the south, under the burning zones of Asia, Africa, and America, water is essential to every species of cultivation. It is applied to the grains, to the vine, and indeed to every plant requiring a degree of moisture that cannot be derived from the atmosphere. Rice, the grain that probably contributes more than any other to the support of human life, and the most important product of southern climes, requires frequent and abundant irrigation; that its "foot should be in the water and its head in the sun," is an indispensable requisite to its profitable cultivation.

In warm climates, irrigation made itself felt as an absolute necessity by the most ancient nations, and stupendous works for the purpose were executed at a period now lost in the night of time. The best known to us are those alluded to in the books of Moses, and described by the profane writers.

From Upper Abyssinia, near the eastern coast of Africa, two chains of mountains descend parallel with the Red Sea, nearly to the Mediterranean; between these two chains flows the river Nile. From its source to about midway its length, it is hemmed in by high mountains, then it opens upon a vast plain which constitutes the kingdom of Egypt. With a surface one-third less than the State of Virginia, this kingdom supported in the time of Sesostris a population of 25,000,000, a standing army of 400,000 men, and was covered with superb structures and magnificent cities. It constituted the first and wealthiest kingdom of the earth; it was the sole emporium of corn to the surrounding nations; it was the birthplace of the sciences that civilized, and of the arts that adorned ancient Greece and Rome; and even now, modern nations are contending for mere fragments of her glorious monuments, with which to embellish their cities; and yet all this wealth, grandeur, power, and civilization may be fairly attributed to irrigation—irrigation on such a scale as the world never saw before or since. The whole territory of Egypt was divided by immense levees and dykes into three great zones, and the waters of a great river were controlled, and managed, and

used for agricultural purposes, as completely as if they had been those of a mere rivulet. Surrounded as Egypt is by naked and sterile mountains, and by the arid sands of the desert, (except upon the Mediterranean coast,) rains rarely fall there; the want of it is in a measure supplied by heavy dews, but still, without the annual overflow of the Nile, all vegetation would speedily wither away beneath a scorching sun. The river, unaided by artificial means, overflows a vast surface, but the ancient Egyptians doubled the extent of their arable lands by compelling the water to spread over a wider space; but time and barbarism have destroyed their works, the glory of Egypt is departed, and her habitable territory has shrunk to less than half its former dimensions. The Egyptians were not the only people who thus made water tributary to agriculture. In the now desolate regions surrounding the once proud cities of Nineveh and Babylon, the remains of aqueducts, tunnels, and canals yet exist, to overwhelm the wondering traveller with their stupendous proportions, and which prove, that even the waters of the Tigris and the Euphrates were rendered obedient to human skill and industry. In China, where agricultural art has remained stationary for centuries, the earliest travellers, Marco Polo, Ruberquis, and others, marked the care with which water was turned to irrigation, and the skill evinced in its application.

From Egypt the art of irrigation passed into Greece, but it never reached there the perfection attained in so many other arts drawn from the same source; and the reason is obvious,—the young men of Greece were educated to public life, they cultivated the finer arts, and the cares of husbandry were abandoned to slaves. Nevertheless, the worship of their gods, of fountains, and of rivers, and the ceremonies attached, prove that the irrigation of meadows and fields was one of the important operations of Grecian agriculture.

Persia, with her burning sky and sandy plains, owes the greater part of her fertility to the use of water, and in that kingdom the art of irrigation is duly appreciated. Laws are still in force there which existed long before the people of Greece grew to national importance, exempting from taxation for a certain number of years such lands as were most skillfully irrigated. From Greece, civilization, the sciences, and the arts passed into Italy, and with them the Romans acquired the art of irrigation, as is proved by the remains of canals and the testimony of the Roman writers on rural economy. The plains of the Milanese were enriched by the waters of the Po and the Adige, which were completely controlled by means of locks and dams, as is shown by an inscription still extant upon a marble tablet at the Roman gate of Milan.

The northern hordes of Goths and Vandals that overran the Roman empire, and who at a later period finally established themselves upon its ruins, though they remorselessly destroyed monuments and temples, spared the works dedicated to agriculture; the dams, sluices, and aqueducts were not only respected, but maintained in efficient repair, and at a later period, when peace prevailed, additional irrigating canals were dug, which are still in existence.

The Saracenic domination, which in the eighth century extended itself with great rapidity around the shores of the Mediterranean, was signalized in Spain by the impulse it gave to agriculture. From the banks of the Oxus and the skillfully watered plains of Persia, Syria, and Babylonia, along the African desert, through the island of Sicily, to the Spanish peninsula,

the indefatigable industry of the Saracens, and that of their ingenious successors the Moors, manifested itself in the prosecution of every kind of agricultural labor. In Spain they carried it to a degree of perfection which has never been surpassed in Europe, never equalled perhaps, except in Holland and the Netherlands.

They had seen in the East and thoroughly understood the one grand necessity of Southern agriculture. When it is said, and with truth, in such a climate as that of England, that drainage is the first great requisite of farming, it is only the expression of a truth which applies in the same sense to irrigation in all soils liable to drought. In England the superabundance of water, here its deficiency, is the great point for correction, anterior to every other improvement. The race of Spanish Arabs had the merit of extending this knowledge and the practice consequent upon it in Europe. By spacious reservoirs, canals, and aqueducts, they conveyed the great ELEMENT OF FERTILITY into remote districts, which had before been barren only for the want of it. Under their care and skill, the plants and vegetables of Asia and Africa for the first time grew side by side with the native products of Europe, and the sugar cane and the cotton plant laid the foundation for that great impulse to European art, which was destined at a later period to cause so great a change in the industry and commerce of the world. Even to this day the traveller in Grenada and Valencia, amidst scenes of utter apathy and indolence, varied only by a chronic system of intestine dissension, worthier of a savage than a civilized nation, often meets the remains of a once magnificent system of irrigation, standing like monuments of the infatigable labours of a race that has passed away, but carrying with them so lasting an attachment to Spain that, long after their final expulsion from Europe, they retained and handed down through many generations recorded titles of their estates, and even the very keys of their houses in the Spanish peninsula.* Hitherto the influence of Saracenic genius, though extending the whole length of the Mediterranean, on both its shores, had little opportunity or inducement to penetrate northward. Spain, their grand and final conquest and favorite settlement, and which had become a perfect model farm of southern agriculture, was too much separated on the only land side from the rest of western Europe, by the broad chain of the Pyrenees, to have produced any extended influence. Its position was altogether unfavorable to northern communication. What the Arab conquests, however, had failed to accomplish, the crusades providentially carried out. When the hosts of rude mail-clad warriors of the West, obedient to the call of the hermit-soldier, poured over the fruitful plains of the East, they witnessed a perfection in the agricultural art of which they had never dreamed before, and such of them as lived to return to their homes took with them the knowledge of irrigation, probably not the least valuable of the many benefits incidentally derived from those senseless expeditions.

The science of hydraulics has participated in the progress made by all the branches of human knowledge. It is conjectured, that in the middle ages, irrigation and the construction of works connected with it were based upon practice and observation only; but now the lamp of science lights the way, and we may proceed boldly onward with entire certainty as to results. Upon many points of Europe new canals have been dug to enable agriculture to profit by the fertilizing effects of water, and the practice of irrigation, even in that (as compared with the United States) moist climate, is extending in every direction.

* Foster's "Mahometanism Unveiled."

In this short exposition it may be remarked, that man from the earliest ages has been led, both by nature and necessity, to water his meadows and fields; that even the most barbarous conquerors felt not only a just appreciation of what had been done for irrigation, but became irrigators themselves. We see, moreover, agriculture always progressing with national liberty and with the arts and sciences. The art of irrigation is, with the exception of the United States, now to be found among all civilized nations; and in certain parts of England and Germany it has made great progress: in the latter country it has probably made greater advances than elsewhere. The country of Seigen has acquired great celebrity for its system of irrigation. Protected and encouraged by the Duke of Nassau, it has become there really an art, and when reference is made in Germany to the method of watering meadows, it is always understood to be such as is practised on the banks of the Seig. Grading the soil—its distribution—the management of the water—in a word, all the processes, are subjected to rules that make of irrigation a real science—which we will now endeavor to explain in such of its details as are of easy application in the United States.

Water.—All the water existing in the atmosphere returns to the earth in the shape of rain, snow, hail, mist, or dew. The permeability of the earth's surface allows the infiltration of water, which descends until arrested by impervious strata of clay, rocks, &c. The fluid follows the inclinations of these strata until pressure or some other cause forces it to the surface, whence the origin of springs. These springs united form brooks, and the union of several of these, rivers; by which the waters flow into the sea. Thus this element forms an endless chain—rising from the sea in the form of vapor, it falls again to the earth, and thence returns anew to the ocean. All the water, then, applicable to irrigation, must be derived from rain, springs, brooks, rivers, or lakes.

Rain-water.—Of the rain-water that falls, the earth can absorb but a small portion. The remainder flows upon the surface to the brook or river towards which the slope of the land inclines. Rain-water at the moment of its fall is the purest of all others, but, in flowing over the surface, it carries off great quantities of fertilizing substances. By conducting these waters (after they have washed a certain space) over the surface of grass lands, they are to a certain extent filtered, and the greater part of the fertilizing matter they contain is deposited upon the sod. The fertilizing qualities of rain-water vary with the soils over which they pass. Thus water flowing over a calcareous soil is considered much better than that derived from a clay soil, because in the latter case a tenacious mud is sometimes deposited, which injures the grass if the irrigation is immediately followed by a drouth. Water flowing over a sandy soil also produces good effects, provided the sand is mixed with clay. But it often happens that such water carries along with it quantities of sand, which can be of benefit only to marshy land. To the use of rain-water for the purposes of irrigation there are two serious objections; first, the irregularity of supply, and then the great quantity of foreign matter usually carried along by it during heavy rains. In some cases, these objections may be obviated without much expense; for instance, in favorable situations dams may be constructed and the water retained until the foreign matter is deposited and until the proper moment for application.

Now and then the accumulated mud may be taken from these reservoirs, and it will, after exposure for a time to atmospheric influences, make excellent manure. Water derived from melting snow is also to be considered as rain-water, but, on account of its low temperature, it has no effect upon vegetation. It can only become useful when, after a detention in the reservoir it becomes warmer, or when it happens to be charged with slime which is deposited upon the meadow.

Spring waters have various properties, which are particularly manifested by their action upon vegetation. These properties are derived from the soil in which the water is amassed, or through which it flows before appearing at the surface. Water flowing through chalk or calcareous strata acts powerfully upon the growth of grass; issuing from a sandy soil or sandstone, its effects are similar, but not so marked. The tannin and other vegetable matters and acids, frequently contained in the waters issuing from forests, injure them for irrigation, and the same remark may be applied to water running from marshes. The temperature of spring water is various; in some cases, it is so low that the water will readily freeze, in others so high as to thaw ice and snow. For irrigation, water of a high temperature is always to be preferred, and very cold water should be detained in reservoirs until the temperature rises, before it is used.

The sweet grasses flourishing around a spring are indicative of the good quality of the water; the sour grasses, on the contrary, indicate the reverse. Water-cresses and long green filaments are good signs; but if, instead of these, the bottom of the stream be covered with a brown floculent substance, and the surface exhibit an oily appearance, its water is to be absolutely rejected.

The beneficial effects of water are greatly augmented by gathering it in a reservoir into which the wash from the house and stables is turned. Meadows in the immediate vicinity of and below the farm-yard thus acquire extraordinary fertility. To distant fields the urine may be conveyed in hogsheads, and mixed with the water in the reservoir; the water may also be enriched by throwing manure into it, but this would be bad economy unless there be a certainty that the whole of the water will be turned to account.*

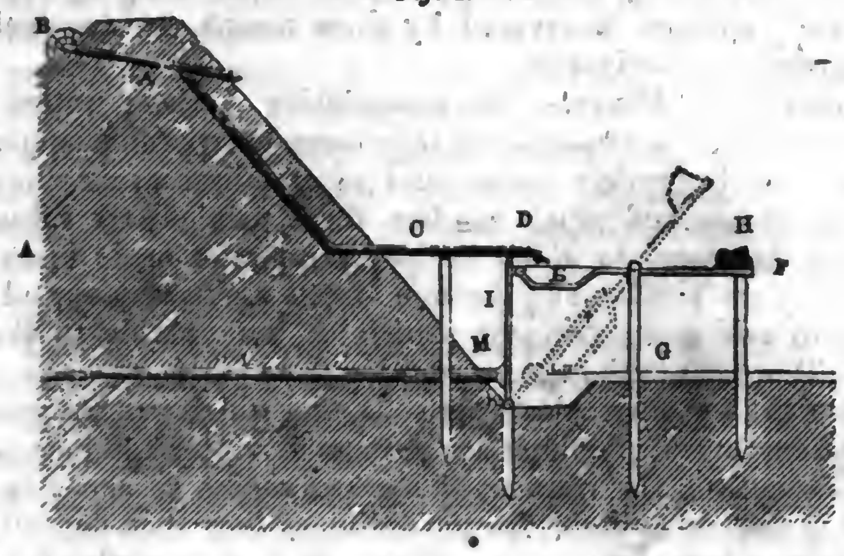
In the Vosges mountains, in eastern France, where irrigation is thoroughly understood, the system of reservoirs generally prevails, and one striking advantage attending it is, that the merest threads of water can be made available. In that country the liquids and offal from the dwelling and stables are collected together with the water from the spring into a reservoir, which is opened as often as it becomes full, and the land irrigated; but as the slope of these mountain meadows is often very great, the water has not time in its rapid flow to deposit all the fertilizing matter held in solution; hence, to avoid the loss of this, and to derive the utmost benefit from the element, it is caught in furrows, after irrigating a certain space, and conducted to a second reservoir, and there detained to water slopes lower down.

Thus, as is often the case, the same water is used several times by the same farmer, and sometimes by several, before it reaches the bottom of the valley. A similar method is practiced in several of the Swiss cantons. Rain

* Guano in sacks of open texture, and placed in the irrigating canal, would probably go further in this than in any other way that could be devised.

and spring water is gathered in reservoirs, and as these are often distant from the house, and it cannot always be known when they are full, a self-acting contrivance is used which lets off the water when it reaches a certain height, and closes the reservoir again when empty. (See drawing, fig. 1.) A is the

Fig. 1.



dam forming the reservoir. B is the highest point to which the water can rise. When the water reaches the point B, it enters the pipe C, and at D pours into a wooden spoon E, the handle of which extends to and rests upon the point F. G is a strong post, with a slat at the top, through which the handle of the spoon passes, and in which it is fastened with an iron pin. H is a stone, to counterbalance the weight of the spoon. I is a narrow plank, movable at the hinge K. At M this plank is furnished with a leather bung, which stops the mouth of the conduit L, when the plank is kept in a perpendicular position by the pressure of the spoon E. The reservoir being full, the water passing by the pipe C falls into the spoon; this becoming heavier than the stone H, its counter-balance, falls, releases the plank I, and the water pours forth at M into the irrigating furrows. When the reservoir is empty, the spoon ascends, the plank I resumes the perpendicular, and the bung stops again the outlet at M. The dotted lines indicate the position of the spoon and the plank I, when the reservoir is full, and the water pouring out at M.

The progress lately made by the natural sciences now furnishes the means of creating artificial springs, supplying abundance of water to places hitherto deprived of it. These artificial springs, called *Artesian wells*, are made by boring to a greater or less depth. To obtain water by this process, there must exist beneath the surface a reservoir lacking a natural outlet; or there must be an underground stream with its source higher than the point at which the boring is effected; and, moreover, the pressure of the water must be such as to force it to the surface. These conditions are usually found united upon extensive plains, without springs at their surface, but which contain subterranean waters, descending from the surrounding mountains. Generally in this case the water is found between two impervious strata, and it gushes out at the surface when the upper stratum is perforated. It often occurs that these reservoirs are at a great depth, in which case boring becomes very expensive. A knowledge of geology and of the formation of the surrounding hills and mountains is an indispensable requisite to the acquirement of the art of boring for water, and it is there-

fore not advisable that the farmer should attempt it unless with the certainty of attaining his object at no very great depth, and at small cost.*

Besides a knowledge of geology, which may point out with some degree of certainty the existence of subterranean waters, there are other signs by which their presence may be detected; these are, plants flourishing only in moist places, and lastly, the emanations of vapor hanging over such spots. But generally springs discovered by these means are too feeble to be of much importance to irrigation.

Brook and River Water.—The composition of these waters is infinitely various; they lose by atmospheric influences the pernicious qualities sometimes possessed by spring water, and at certain seasons they carry with them an unctuous mud which renders them particularly valuable. There are streams, however, to which the same remarks made upon springs will apply. They are such as run through forests and marshes, and thus become charged with acid and astringent principles, unfavorable to the growth of grass. Still worse are the waters running from mines, forges, and tanneries. Streams which flow over calcareous soils, and which are charged with calcareous sediment, are of excellent application in winter and autumn; but their use must cease from the moment the grass begins to shoot in the spring, especially in time of drought, for the sediment they then deposit is injurious. When trout, pickerel, or crayfish thrive in a stream, the inference is, its waters are well adapted to irrigation, no matter what appearances may be in other respects.

In relation to this subject, Professor Johnston writes thus, describing some water sent him for analysis:—

"The water rises from several natural springs, which, after being united into one body, are directed into the artificial channels provided for the irrigation. It is perfectly transparent, colorless, and tasteless. It is very soft, scarcely giving any curd with soap; and the application of chemical tests shows it to contain a very minute proportion of gypsum and common salt.

"When evaporated to dryness, it leaves a very small residue of solid matter. An imperial gallon leaves only 5.2 grains. It is therefore an exceedingly pure water. I have never, indeed, met with a natural spring water in which the proportion of solid matter was so very small.

"When the proportion of solid matter is so minute as this, it is difficult to obtain a sufficient quantity for a quantitive analysis. Our supply of the water amounted only to about a gallon, so that the results of the subsequent analysis of the 5.2 grains, made by my first assistant, Dr. Vœlcker, are of course open to correction. This analysis gave for the composition of the solid matter in an imperial gallon:

"Alkaline salts, (chiefly common salt,)	1.14 grains.
Sulphate of lime	1.66
Carbonate of lime	0.26
Carbonate of magnesia	0.46
Organic matter	0.76
Silica	0.92
	5.20 grains.

* In portions of the State of Alabama these wells abound, and the expense of boring is not great.

"The result of this analysis is very interesting. It shows, that what we are in the habit of considering the purest natural spring waters, containing the smallest proportions of mineral water, may be used with advantage for the purposes of irrigation. It is true that, though the proportion of mineral matter is small, it is all of a useful kind, such as is fitted to supply the necessary wants of the growing herbage. The silica, the gypsum, the lime, the magnesia, and the alkaline salts, are all the food of plants, and are required in the growth of grasses. The absence of iron in any appreciable quantity is probably a favorable circumstance, and allows the other ingredients of the water to produce their full effect upon the vegetation. That these ingredients do really favor vegetable growth, is shown by the *numerous water-cresses* which grow naturally in the water. So far as my experience goes, indeed, I should say that any water in which water-cresses spring up may be safely employed for irrigation.

"The result is also encouraging. So long as it was believed that waters which descended from lime-stone districts, or which from other sources are impregnated with much mineral matter, would alone prove useful to the irrigator, doubt and hesitation could not fail to exist in the mind of the practical man as to the pecuniary advantage he might derive from any outlay upon irrigation. There is scarcely a stream among our hills and mountains in which the advantages of a skillful irrigation may not be confidently anticipated. Another point I may advert to as suggesting itself in connection with the composition of this water. If the benefit obtained from its use be so great as to increase the value of the grass nearly ten times, though the supplies of solid food it contains are so very small, how much greater should be the effect of those far more rich liquids that flow from our farm-yards, or which after showers of rain exude from our dung-heaps and escape into the nearest brook? Even enlightened farmers, who are aware of the value of the more concentrated liquids of their cattle-yards and stables, are yet sceptical as to the worth of such as, by their color, betray no marks of richness. The water of Glenythan is far less rich than any of these, and yet it caused land that rented for only one dollar and twenty cents an acre to yield *four tons of hay per acre.*"

Means of improving the Quality of Water.—Any water naturally unfitted for irrigation may be so treated as to be rendered useful for that purpose. Water may be unsuited to the growth of plants from three causes. It may be too cold, or, from a prolonged sojourn in a bed wanting inclination, it may be too warm; again, it may become stagnant and charged with principles inimical to vegetable life. As has already been stated, the collection of the water in reservoir until the temperature rises, is the remedy for the first evil; and motion communicated in various ways will correct the two last. The fertilizing power of a stream may be greatly augmented by placing in its bed a coffer, constructed of slats, which is filled with such manures and offal as can thus be disposed of. Patzig, who recommends this course, says a mixture of sheep's-dung and lime, thus used, produces the most astonishing results; moreover, says the same author, "Instead of burying the animals that die upon the farm, they should be thrown into this coffer, and the meadows will be thereby greatly benefited. In a short time a bluish colored oil will be seen upon the surface of the water, which, deposited upon the sod, communicates to vegetation the most extraordinary activity. The solvent power of running water is remarkable, and much greater than is usually supposed, for at the end of six months not a trace

remains of the carrion thrown into it; all, even the bones, are dissolved and carried off."

Action of Water upon different Varieties of Soil.—Wherever water exists, a meadow may be created and grass grown, and though this is the case on all soils, the action of water is nevertheless subject to variations depending upon the surface upon which it is applied. Water nourishes and stimulates vegetation—it affords a protection from sudden atmospheric changes, and, finally, it delivers the meadow from many enemies, as well animal as vegetable.

Water nourishes Plants.—Considered as a manure, (as has already been shown,) water contains mineral, vegetable, or animal particles, and occasionally all three. Water charged with any of these enriches by its deposits the surface over which it flows, but motion is necessary. The proof of this is, that the fertilizing action is much more apparent upon meadows of rapid inclination than upon those that are not. In this last case the water flows slowly, depositing only the grosser matter which it contains: while the finer particles, those the most favorable to vegetation, are lost, because there is not sufficient friction to separate them. Where the surface is too level, the water dwells upon it—a portion is absorbed, while the remainder is evaporated, not only without any beneficial effects, but acids are formed which destroy the valuable, and favor the growth of useless plants: this evil may often be remedied by increasing the quantity of water, as then from its own weight it acquires a swifter motion. If the grass should grow thicker, and better, along the edges of the trenches, the inference is, that the irrigation is imperfect, and the surface should receive more slope, that the action of the water may be extended to points more remote. Vegetation, however, to a certain extent, is always more active near the trenches; the water as it advances becomes despoiled of its enriching ingredients, and the ground should accordingly be so disposed as not to irrigate too wide a space with the same water. When the quantity of fluid to be disposed of is small, as is generally the case when that from springs is used, the surface can scarcely be too much inclined, for then the effects of the water seem to multiply and extend much farther. If, where the quantity of water at command is small, the slope cannot well be too great, it is not the case where the supply is abundant; and due care should be observed in proportioning the quantity of water to the degree of slope, for much water flowing rapidly will wash away the vegetable earth and lay bare the roots of the grass.

Water a Stimulant to Vegetation.—It has been observed that the pores on the under-side of the leaves of such plants as grow upon irrigated land are larger than those of the same plants growing elsewhere. The inference is, that the first possesses greater powers of absorption, and that irrigation increases their vitality, and renders them capable of taking in a greater quantity of the atmospheric gases.

Water protects and preserves Plants, for as long as water runs upon a meadow, the temperature remains uniform, and the ill effects of sudden atmospheric changes are prevented. Even where vegetation is overtaken by frost, it may be protected from injury by letting on the water before a thaw. Finally, water is an efficient agent in delivering meadows from destructive vermin and insects, such as mice, moles, grasshoppers, &c. In the same way, properly applied, it destroys the sedge and heath of dry, and the sour vegetation of cold, wet land.

These different effects of water are modified by the nature of the soil it

flows over. Thus there is no soil better adapted to irrigation than that which is sandy; though naturally dry and sterile, it can with sufficient moisture be converted into excellent meadow, and this is probably the most profitable disposition to be made of it. Precaution, however, is necessary in watering sandy land, for if it be loose and shifting, it must be allowed, after being properly graded and seeded to grass, to stand a year before irrigation commences; otherwise the water will filter through the surface and re-appear in the lower trenches, oxidized and spoiled. It is bad economy to be deterred by expense from covering a sandy surface with grass. The quality of the grass is a secondary consideration, the main object is to *bind the sand.* Subsequent irrigation will soon change the nature of the growth, whatever it may be, and the finest herbage will supply its place. Should the sand be mixed with clay, even in small proportion, barely enough to give it some consistency, it may at once, without previous preparation, (other than grading,) be submitted to irrigation. Before a sandy soil becomes consolidated and well clothed with grass, it requires a great deal of water, and that which is turbid and muddy, as it usually is after rain, is best suited to it. An equal mixture of sand and clay makes the best meadow, yielding in quantity and quality the finest crops; it is improved by any water not naturally bad, and requires much less moisture than sandy land.

A stiff clay is not well adapted to "water meadows;" roots penetrate it with difficulty, and of all soils it is the most difficult to irrigate; very little water should be let on at a time, but the irrigation must be prolonged. A strong flow of water covers the surface with a cement which adds to the natural tenacity of the soil, and which becomes indurated, almost to the hardness of brick, on exposure to the sun. The best corrective in this case, where the means are at hand, is to add to the clay an earth of less consistency—the work will be facilitated and the vegetable growth increased. If in grading land for irrigation, it becomes necessary to remove the sod, (to be replaced when the grading is done,) there must be no precipitation in letting on the water; the sod must first be allowed to take root; else the water, running between it and the land, will prevent the roots from striking in, and the sod will perish.

Calcareous soils, being naturally warm and rarely retentive of moisture, are liable to suffer from drought, and for this reason they are peculiarly suited to, and are much improved by irrigation. Though almost any water is beneficial to them, that from springs is to be preferred, and they not only produce largely, but the hay is of the very best quality.

Fig. 2.

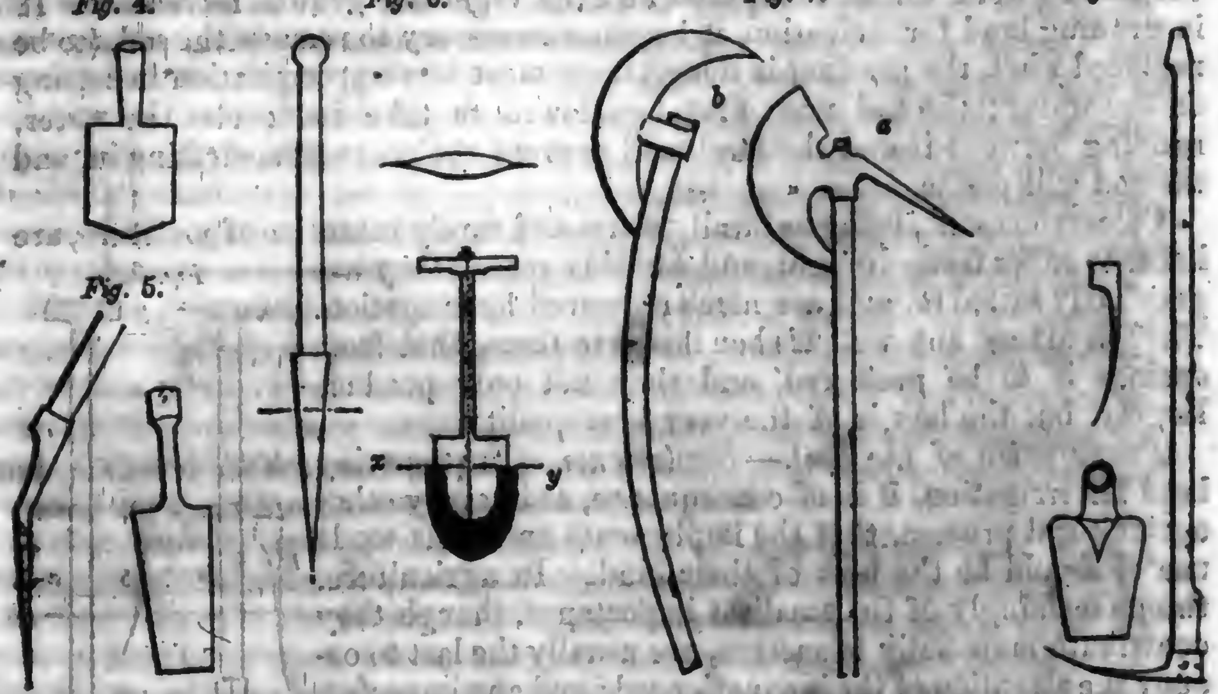
Preparation of the Soil.—Implements. In preparing land for irrigation, it is of consequence, as in every other agricultural process, that the implements and tools made use of should be the best of their kind. In agriculture, things seemingly of the smallest importance, though they contribute materially to success, are usually the last to occupy the attention of the inexperienced; and any imperfection in its various processes may generally be traced to a deficiency in, or neglect of the tools or implements employed; and for this reason what otherwise might appear rather too minute a description of the several instruments and the manner of using them in preparing land for irriga-

Fig. 3.

tion, is here given. *The spade,* (fig. 2, *a.*) Notwithstanding the simplicity of this implement, it is always important, and indeed indispensable, and should occupy the first place; *b* represents the spade in profile. The curve is essential. This implement is not destined to turn up the earth, but to pare off the sod, to level the bottom of trenches, to cut by a line, &c. Except the handle, (four feet long,) the whole is of iron, and the sides as well as the lower edge are kept tolerably sharp. The more spongy and mossy the ground is, the greater the necessity to keep the spade sharp, and as the implement is usually pushed forward by the pressure of the hands and chest, it requires a longer handle than those in ordinary use. Schwerz, from whom this description is borrowed, thinks it would be well (where the works are extensive) to have spades of different widths, to be used as the dimensions of the ditches and trenches may require. Where a single spade is used, it should not be wider than eight inches. Schwerz recommends still another, (figs. 3 and 4,) which he considers indispensable for lifting the sod, flattening the bottom of ditches, &c. The irrigators in the Seigen country do not attach as much importance to the spade as does Schwerz, and in its stead they use the shovel, (fig. 5.)

The round spade, (fig. 6,) though not mentioned by Schwerz, or used by the farmers of Seigen, will be found exceedingly useful. It is made of a single piece of wood, shod with a crescent (x, y) of steel, and is principally used for cutting the sod in lines by a cord. It may be as well to observe that in using it, it should not be withdrawn from the earth at every cut; on the contrary, it should be retained in the ground, pressed to the cord, and advanced by a circular motion one-third of its length at each cut.

Fig. 4. Fig. 5. Fig. 6. Fig. 7. Fig. 8.



The crescent, (fig. 7.)—The round spade is best for the deeper ditches that carry off the water, but for the smaller irrigating trenches the crescent is preferred. The drawing is from the implement in use in Seigen. At the back of the blade a hoe is usually attached; this, though not essential, gives weight to the tool and effect to its blows. This hoe (fig. 8) may be

used separate from the crescent. The crescent serves to cut the edges of the trenches, and some skill is required for its use, as an awkward workman is very apt to cut the cord, which should always be used when straight lines are to be traced. When a trench is to be dug, the edges are cut with the crescent, and the sod between is taken out with the hoe. This operation is much facilitated when transverse cuts of the sod are made at short intervals. Fig. 7, *a*, *b*, are crescents without and with the grubbing hoe.

Fig. 9.

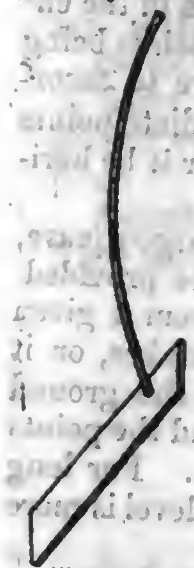
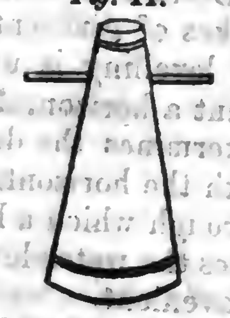


Fig. 9 is a flattening-board made of ½ inch oak plank, as heavy as can be conveniently lifted, with a slightly curved handle. It is used for "patting" down the sod and loose soil. Figs. 10 and 11 are mauls, to be used where the action of the levelling-board is not sufficiently powerful. For moving sods and soil to short distances the ordinary wheelbarrow should be used, and to avoid making ruts the tire should be unusually

Fig. 10.

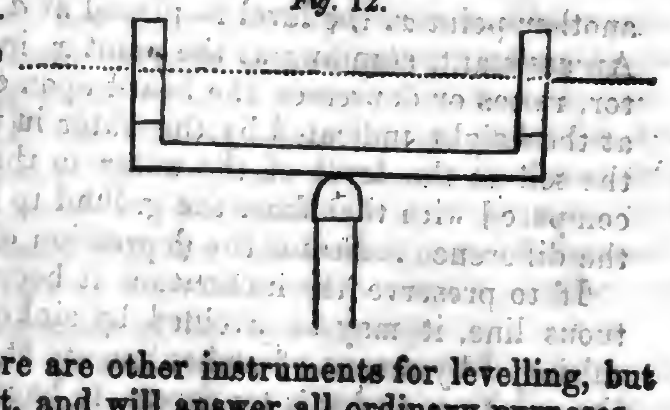
Fig. 11.



broad. The road-scraper is a valuable implement, but it should not be used to carry dirt more than 35 yards.

Levelling, or Grading.—Before cutting ditches or trenches, the surface should be levelled, in order to trace out the plan of the works to be executed. For this several instruments are required. First, the water-level, made of ½ inch tin tube, a yard and a quarter long; the extremities of this tube are turned up at right angles, and are surmounted by glass tubes of the same diameter a few inches long. (See fig. 12.) This tube is supported by a base that may be lengthened or shortened at will, like a common spy-glass, and a sufficient quantity of any colored fluid is put in it to rise halfway in the glass tubes. When the surfaces of the fluid are exactly at the same height, a line drawn through them is horizontal. There are other instruments for levelling, but the above described is the cheapest, and will answer all ordinary purposes.

Fig. 12.

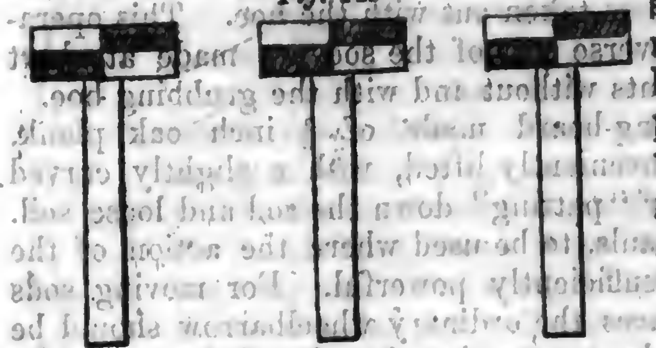


The levelling staff (fig. 13) is an indispensable adjunct to the water-level. This staff is three or four yards long, planed perfectly smooth down to two inches square, and marked off into feet and inches, or, what is better, tenths of a foot. Sliding upon the staff, and provided with a clamp or thumb-screw to fix it, is a board

Fig. 13.

five inches square, divided as in the figure. The central cross formed by the lines is the point sighted at in taking levels.

Fig. 14.

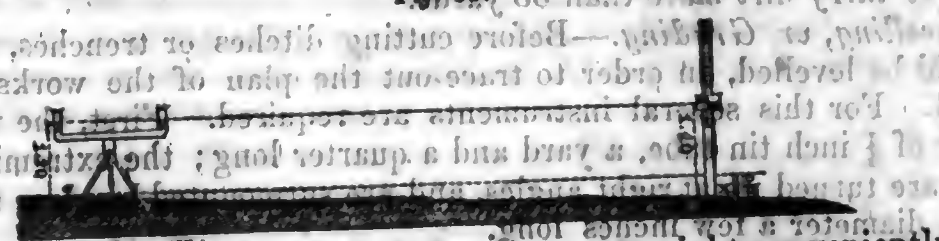


For short distances a much more simple instrument is used, the ordinary masons' level. The sighting boards, (fig. 14,) three in number, are pickets four feet and a half high, with boards at the top, as in the engraving. Two extreme points being given, these boards serve to ascertain one or more intermediate points on the same line, whether it be horizontal or inclined.

Besides the instruments above described, a surveyor's chain, a large square, stakes of different lengths, a maul, and gardener's line, should be provided. By levelling is understood the operation by means of which from a given point a horizontal line is drawn, and which is marked off with stakes, or it determines the degree of inclination formed by the surface of the ground with the horizontal line, or, finally, it determines upon the ground the points through which a line will pass, the inclination of which is given. For long lines the water-level is used, but for short distances the mason's level is more convenient.

If it is desired to draw a horizontal line from a given point *a* (fig. 15) to

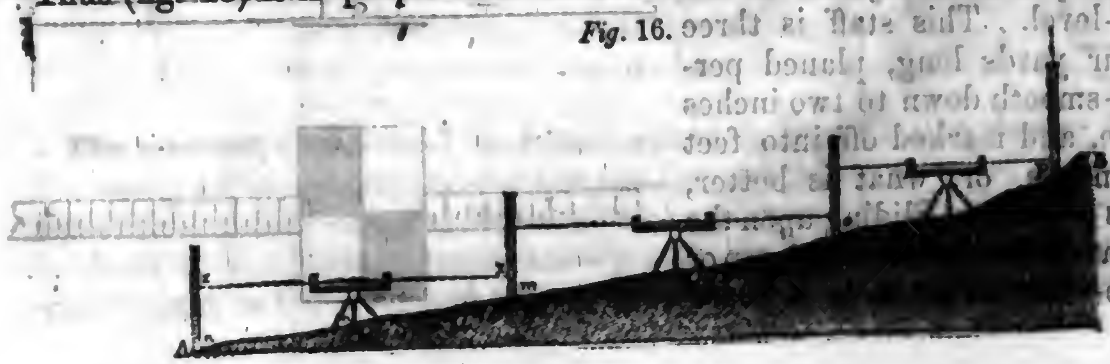
Fig. 15.



another point *x*, the level is placed at *a*, so as to sight conveniently at *x*. An assistant, standing at the point *x*, in obedience to signs from the operator, raises or depresses the board upon the levelling staff until it is exactly at the height indicated by the water in the glass tubes. The height from the soil to the level of the water in the instrument is then measured and compared with that from the ground to the cross on the marking-board, and the difference indicates the depression of *x* below *a*.

If to preserve the inclination it becomes necessary to follow a very tortuous line, it may be avoided by sinking the ditch at certain points, and raising it by means of embankments at others. If the inclination between the points *a* and *x* is too great to be measured by the height of the staff, the distance must be divided into shorter lengths that can be measured. Thus (fig. 16) it is proposed to level the line AB or rather to ascertain the

Fig. 16.

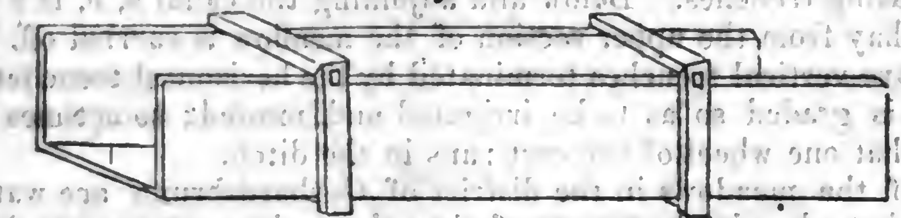


elevation of P above *n*, but the point *n* is so low as to render it impossible with the level to sight to P. The level is then moved to the point *a*, whence it is easy to sight to *n*; the point where the line of sight strikes the staff at *n* is marked. The level remaining in the same place, sight is then taken at *m* and the point of intersection also marked; a horizontal line *z x* is thus obtained, and the difference of the two heights is the exact indication of the height of *m* above *n*, and so in succession with the other lines. The heights of *m* above *n*, of *o* above *m*, and of P above *o*, are added together, and their sum is the height of B above A.

Dams.—It is not necessary here to give directions for the construction of dams; but it may be as well to observe, that whenever they can be dispensed with by prolonging the irrigating ditch a few yards, it had better be done.

Aqueducts are frequently required to convey water over or under streams. They should be constructed as in fig. 17, of two-inch oak plank.

Fig. 17.



Hill-side meadows.—The irrigation of hill sides and mountain slopes, as practised at Gerhardsbrunn in Germany, is perfectly suited to the present state of American agriculture, and if generally adopted it would not fail to add vastly to our production of forage. The hill side to be watered is grubbed, the stones or rocks that can be conveniently moved are carried off, and the land thoroughly cleansed and reduced to a fine tilth. If, after this, slight depressions remain upon the surface which would retain water, they are filled up and the land is seeded to grass. As soon as a sod is formed sufficiently close to prevent washing, the main irrigating ditch is cut along the top of the field with a fall of not more than one foot in 3500: from the main ditch, small trenches two inches wide are neatly cut in the sod, and follow all the sinuosities of the ground, so as to cover as great a surface as possible with running water. If the surface to be irrigated is old field already turfed over, it is best not to break it up; all that is necessary is to remove any impediments to the sweep of the scythe, to cut the main ditch and trenches and let the water on immediately; the old sod will soon be replaced by grasses of the best quality.

Fig. 18.

If the slope to be irrigated is very wide a second horizontal ditch should be cut in it, as in figs. 18 and 19.

a, *a*, and *b*, *b*, are the ditches distributing the water derived from *c*, to the upper and lower sections of the meadow—*b*, *b*, besides taking water from the stream, gathers that descending from the upper section of the meadow.

Fig. 19.

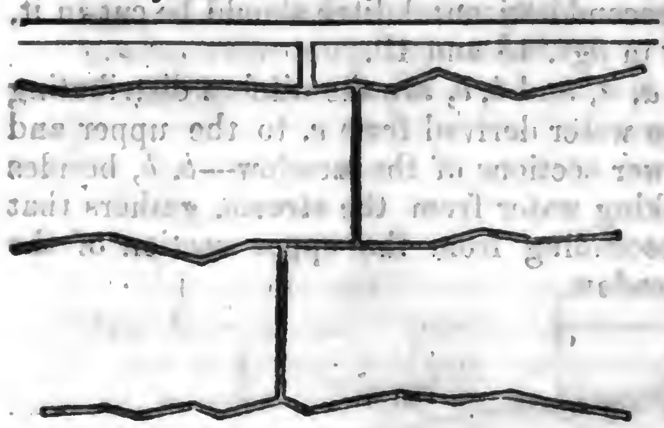
d, d, are rocks or hillocks that could not be removed, *g, g, g,* are the small irrigating trenches. Below and adjoining the canal *b, b,* is a road by which the hay from the upper section of the meadow is carried off.

i, i, i, i, are vertical trenches terminated by the horizontal trenches *k, k, k.* The road is graded so as to be irrigated and mowed; sometimes it is so arranged that one wheel of the cart runs in the ditch.

Many of the meadows in the district of Gerhardsbrunn are watered in this way; but when in the course of time the eminences are cut down and the depressions in the surfaces filled up, and all obstacles removed, a much better system of irrigation prevails. The bare spots occasioned by cutting down a hillock or filling up a hollow, must be sodded or seeded; if there is not enough sod to cover the entire surface, it should be cut into strips and pounded in. The improved irrigation of hilly meadows consists in replacing the irregular cuts by horizontal trenches, which are supplied by a distributing ditch. The irrigating trenches should be traced by the mason's level. They must be perfectly horizontal, though it is not necessary they should be perfectly straight; on the contrary, they may describe as many curves as the undulations of the surface and the necessity for preserving the horizontal may require.

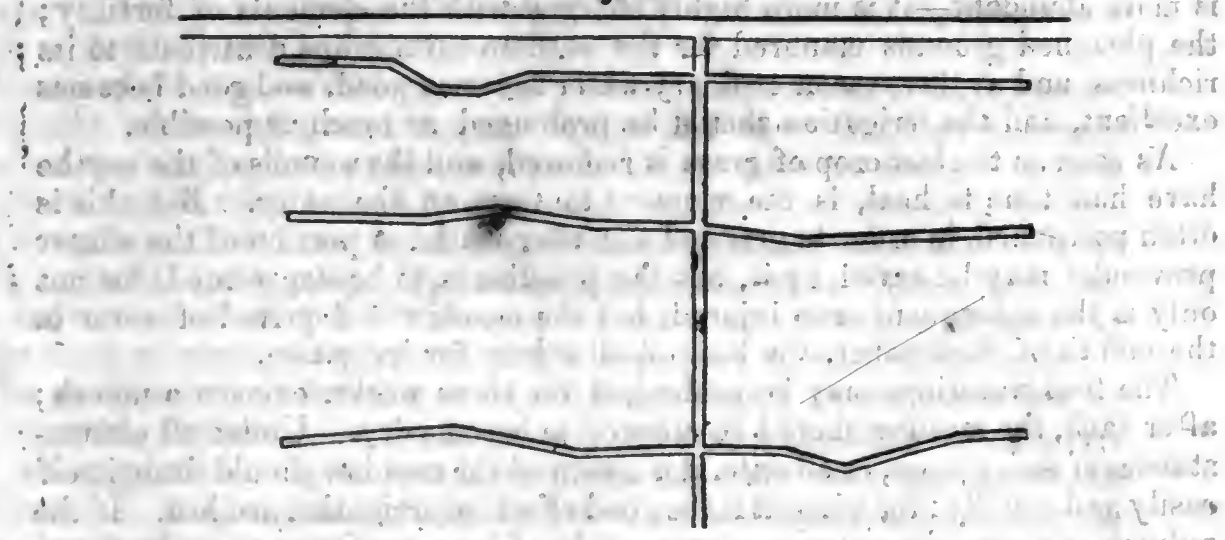
As before stated, the distance between the trenches depends upon the nature and supply of the water and upon the inclination of the surface. On this subject it is difficult to lay down precise rules, because it would be necessary to measure the quantity of water and the degree of inclination. In general, however, it is best not to be too sparing of the smaller trenches; indeed, there cannot well be too many of them. On surfaces with a fall of four or five feet in a hundred, the distance between them should not exceed eighteen feet. The irrigating trenches may be supplied from the main canal by a vertical trench, or each irrigating trench may have its own feeder proceeding directly from the main canal, (figs. 20, 21.)

Fig. 20.



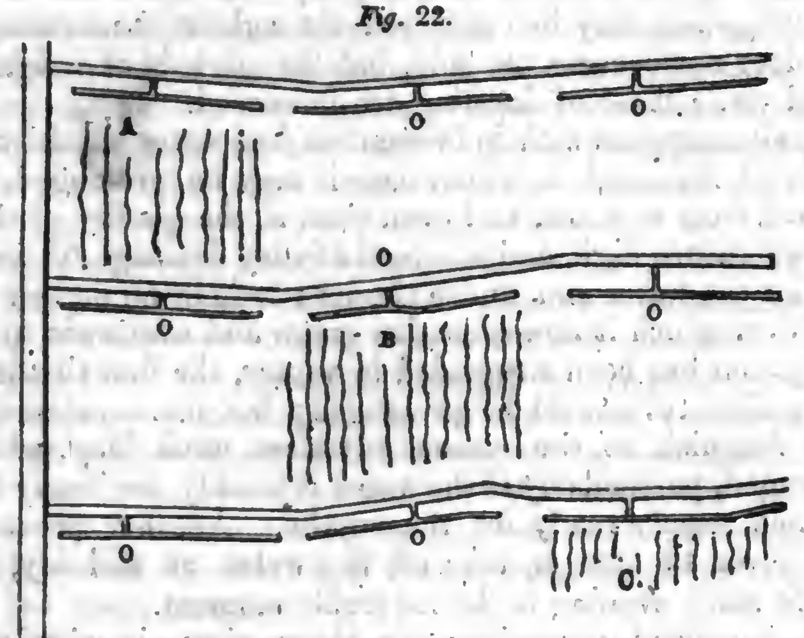
It will be perceived that in fig. 20, care has been taken to prevent the vertical trenches from corresponding directly with each other; because, if the fall (as is supposed in this case) is rapid, these vertical trenches would form a continuous straight line, and the increased action of the water in consequence would soon wash the land into gulleys.

Fig. 21.



A better arrangement is to furnish each irrigating trench with its own trench of supply, as in fig. 22.

Fig. 22.



If there should not be sufficient water to cover the whole surface at once, it is cut off from the different trenches at the points marked O, (an ordinary shingle will answer the purpose,) and only portions of the meadow, as at A, B, C, are irrigated, and the water may be shifted at will, from one spot to another, merely by moving the shingles at O.

General Directions.—The degree and duration of an irrigation may be modified by several causes. Thus water naturally suited to the purpose may be applied throughout the whole winter if the cold is not so great as to congeal it. Water of indifferent quality should not be used in winter, unless the meadow is manured. At a short distance from their source, the temperature of nearly all waters is favorable to vegetation, and they may therefore be used at all seasons. The effects of irrigation are also much modified by the seasons, and, as a general rule, autumn waterings are to be preferred; they renew the vigor of plants exhausted by previous cropping, the turf becomes closer, the young plants newly sprouted from the seeds left by the

first crop are invigorated to resist the coming winter, and the whole meadow, as it were, clothes itself to encounter the cold, and in early spring the grass starts forth more flourishing than ever. Again, in the fall water is more abundant—it is more highly charged with the elements of fertility; the ploughed grounds manured for the autumn-sown crops contribute to its richness, and at this season ordinary water becomes good, and good becomes excellent, and the irrigation should be prolonged as much as possible.

As soon as the last crop of grass is removed, and the wounds of the scythe have had time to heal, is the moment to turn on the water. But this is often postponed, in order to graze off the after-math: a portion of the winter provender may be saved by it, but the practice is to be deprecated, for not only is the subsequent crop injured, but the meadow is deprived of water in the month of September, the best of all others for irrigation.

The first waterings may be prolonged for three weeks, or even a month; after each, the meadow should be allowed to become dry. Under all circumstances of soil, season, or climate, it is essential the meadow should drain itself easily and rapidly; for without it the good effects of irrigation are lost. If the autumn is warm, the waterings must not be of long continuance, and as soon as a little scum or foam is perceived on the grass, they should cease; to be renewed as soon as the meadow becomes dry. If the water is of the best quality, the irrigation may be continued throughout the autumn as long as the weather does not become too cold, but the periods of irrigation should be diminished while those of draining are increased.

In winter, all irrigation with indifferent or bad water should cease, unless the land be well manured, in which case it may be prolonged, until interrupted by hard frost or snow, and even then if the quality of the water be good, the temperature high, and the land of easy drainage, there can be no objection to let the water run under the ice; it is in no danger of freezing, and the turf over which it flows remains green and continues to grow.

If the irrigation has been suspended in winter, the first that is given after the weather moderates should be prolonged; but the duration of those following must diminish as the season advances until May, when they are usually suspended, particularly if the water is muddy, for it may then "foul" the grass, when nearly ready for the scythe. Another precaution to be observed is, never to turn or take off the water at mid-day, particularly under a bright sun; evening is the favorable moment.

The most beneficial irrigations are those given in cloudy and rainy weather. With warm rains and southerly winds, herbaceous vegetation acquires great activity, and the growth of grass is rapid, and should the rain be cold, the brook water tempers its chilling effect upon the meadows.

Late spring frosts are to be dreaded, and all irrigation must cease when they are threatened. After the weather moderates, a few days' watering will repair, in a great degree, any damage that may have been done. If, however, there be an abundance of water at command, a full flow during the prevalence of frost will prove an efficient protection. The water is usually let on in the evening before the dew falls, or in the morning after it disappears. There is no reason assigned for this, but it is the usual practice.

Both the extremes of heat and cold are to be avoided during the irrigation; and if, as before stated, it may go on with suitable water when the thermometer falls one or two degrees below the freezing point, it is on the express condition that the water runs off freely, for wherever sheets of ice remain in contact with the turf for some time, the shallow-rooted plants will perish, leaving none but those with deep roots and of little value.

In rainy seasons the object of irrigation is to fecundate, and not to give moisture; it may therefore be abundant with good water, and should be very slight with that which is bad.

Nature of the Soil.—Varieties in soil induce modifications in its irrigation. Thus light sands and gravel require longer and more frequent waterings than heavy clays, and these last require a longer time to drain. Inclination of surface is another modifying cause. A light soil, with little inclination of surface, should not be so long or so often under water as if it were much inclined, and a steep clay surface can receive more than a level one. The appearance of scum or foam upon the sod is an indication of suffering in the roots of some of the plants, and is a warning to shut off the water.

The abundance and duration of an irrigation should not be controlled by the vegetable surface alone, for frequently beneath a shallow vegetable surface an impervious clay is found, in which case the watering should be moderate; if, however, the sub-soil be gravel or sand, the irrigation may be more abundant.

Location and Exposure of Meadows.—The site of a meadow has an important bearing on its irrigation: thus, a sloping surface or a southern exposure requires more water than a level surface or a northern aspect. It may be remarked that meadows facing the south, though earlier than others, and producing better forage, are more liable to injury from late frosts, and it is best where the climate is variable not to force them by premature watering. Eastern should be more moderately irrigated than northern exposures, because vegetation is more active upon them, and they are more liable to white frosts. A western, being warmer, requires a little more water than an eastern aspect: and finally latitude is a serious consideration, since a southern evidently requires more water than a northern climate.

It may be objected that the wonders wrought by irrigation in Italy, Spain, and other southern countries, are to be attributed to climate, and that the system would not confer equal benefits upon the agriculture of the United States. To show how groundless such an objection would be, it will only be necessary to cite results obtained in England and Scotland, countries where the farmer has to contend, not with parching droughts, as in America, but with too much moisture.

Colman, in his "European Agriculture," states that the most extensive and finished works of irrigation, or as they are called there *water meadows*, to be found in England, are at Welbeck in Nottinghamshire, at the residence of the Duke of Portland. They considerably exceeded three hundred acres, and were being extended at the time of his visit. These meadows receive no other manure beyond that furnished by the water, yet *every acre in its produce, consumed by cattle on the farm, supplies manure for five acres of other land.* Corringham's Report of Nottinghamshire, alluding to these meadows, states that their annual value had been raised from £80 to £3600. The water meadows at Audley End farm are described by Mr. Colman as being formed of old pasture without disturbing the sod, and as yielding in two annual cuttings six tons to the acre. The same author concludes his description of the irrigated meadows he saw in England thus:

"I shall close this part of my subject with the remarks of Philip Pusey, Esq., M. P., which are always deserving the highest attention, and which are as applicable to many parts of the United States as to those

places to which they immediately refer:—'I have known Mr. Roals' farm for many years. It stands alone on the wild Exmoor range of mountain land. If any one asserted, that, for a trifling outlay, he could enable heath-covered steeps to rival, in produce and value, the old grazing grounds of Northamptonshire, he would be regarded as a dreamer. But if any owner of moors will visit Somerset, or North Devon, he will ascertain the literal truth of the statement, as I did five years ago. All that is required is a streamlet trickling down the mountain side, or a torrent descending rapidly along the bottom of the glen. *The profit of under-draining old arable land appears trifling, when compared with the profit of thus forming water meadows;* which, according to Mr. Roals, is more than one pound interest for two pounds invested.'

"The two pages of this report, which state no more than Mr. Roals himself has done, contain a talisman by which a mantle of luxuriant verdure might be spread over the mountain moors of Wales and Scotland, of Kerry and Connemara." New England especially, and many parts of the other States, are full of sites and means for such improvements, and in many cases the expense of labor and levelling the land, bringing the water into a body and placing it under control, would be met many times over by the profits of such improvements."

The account given by Mr. Colman of a system of irrigation with the sewerage water of Edinburgh is exceedingly interesting, and though by no means of general application, it is inserted here entire, with a view of showing how immensely valuable to agriculture would be the wash of our own cities, if, as in the Scotch capital, it were turned to account.

"I come next to speak of a system of irrigation established in Edinburgh, which I looked at with a good deal of interest, where the sewerage water from the drains of the city is applied to grass lands in its neighborhood, which by this means are rendered most extraordinarily productive.

"The drainage water from a large portion of the city of Edinburgh is collected into covered carriers and drains, and from these emptied into a stream of water, very properly, as one may suppose in such a case, called the *Foul Burn*, the term *burn* being the Scottish name for a small stream or brook. Here it passes along, in an open brook, among some flat lands, which by proper arrangements it is made to overflow. I should state that before it reaches the places where it is thus diffused, it is received in tanks, where the more solid parts are deposited. It does not require any extraordinary acuteness of smell, on approaching these irrigated lands, to become satisfied that the waters, even after passing from the cisterns or tanks, are sufficiently charged with odoriferous particles held in suspension.

"This water, thus received, is diffused over three hundred acres of land; and these lands are rendered productive to a most extraordinary degree. One of the principal proprietors, who held his land under a long lease, at a rent of £5 per acre, and sub-let this irrigated land at £30 per acre, informed me that it was sometimes cut seven times in a season. The grass is carried into the city, a distance of two and three miles, for the support of the cows, which supply the city with milk. Different channels or gutters are made for the water so that the whole may be flooded. It is applied generally after every cutting, where the situation admits of it; but it is found advisable not to apply it immediately upon the grass being cut, nor before it has obtained some small growth.

"The offensive exhalations from meadows thus treated have been the subject of prosecutions at law. In the testimony adduced on these occasions, it has been stated that the rent for which some of these meadows are leased in small portions to cow-feeders varies on an average from £20 to £30 per acre. Some of the richest meadows were let, in 1835, at £38 per acre; and in that season of scarce forage, 1826, £57, or $285, per acre, were obtained for some meadows. The waste land called *Figget Whins*, containing thirty acres, and ten acres of poor sandy soil adjoining them, were formed into water meadows, in 1821, at an expense of £1000. The pasture of the Figget Whins used to be let for £40 per year, and that of the ten acres at £60. Now, the same ground, as meadows, lets for £15 or £20 an acre per year, and will probably let for more, as the land becomes more and more enriched; that is, land which before the irrigation let for about $500 per year, now, under this improvement, yields an annual rent of from $3000 to $4000. The irrigation is continued at different times, from the first of April to the middle of September. The parties interested in defending the use of this water for irrigating these lands, maintain that the grass produced in these meadows by this process supports in Edinburgh 3000 cows, and in Leith 600 cows. It is added, 'that the parties interested in the lands estimate the compensation which would induce them to discontinue the practice at £150,000, or $750,000. This is stated as the sum which the proprietors at the west side of the city would be entitled to, exclusive of those at the east, were the practice abolished by government.'"

It is to be hoped that the results of irrigation above described and vouched for by Mr. Colman, will be sufficient to awaken the American farmer to the incalculable value of the system, and induce him to put in practice the simple rules laid down in this essay.

UNDER-GROUND WATER-CONDUITS.

Pipes for conveying water for domestic use, for watering cattle, irrigation, or other purposes, may be economically constructed of concrete, made with hydraulic cement or water-lime, which are of the most permanent and substantial character.

The best hydraulic cement should be used, and care be observed that it be fresh burned, and that it has not been exposed to contact with air or moisture, which soon destroys its property of quickly hardening when made into mortar or concrete.

Clean river or bank sand, and clean gravel or pebbles about the size of a nutmeg, and from that down, will also be required. If the gravel cannot be found of suitable quality, as it generally may be at the bottom and on the banks of small streams, it may be prepared by twice screening from any gravel bank, the first to remove the large stones, and the second to sift out every thing less than an eighth of an inch in diameter.

Proportions.—The use of the sand and gravel has a two-fold object—1st, economy, the cement being by far the most costly of the three materials; 2dly, to prevent the mortar from cracking as it dries, which would be the case were cement alone used. For this latter purpose, sufficient cement paste should be used to fill the interstices of the sand, with a slight excess of the former to allow for imperfect manipulation; and with the mortar thus made the void space of the gravel is to be filled, allowing an excess of mortar as

before, to insure a concrete without air-holes or void space. To answer these conditions the following proportions have been found sufficient:

Cement, dry as it comes from the barrel	1 measure.
Sand, dry and clean	2 "
Gravel or pebbles, clean	4 "

Manipulation of the Concrete.—The sand and cement are to be thoroughly mixed by turning them over in a dry state a few times. Sufficient water is then sprinkled on from a watering-pot to moisten the heap, without forming it into mortar. Care is necessary in this part of the operation, for if sufficient water be added to form the cement and sand into a mortar, then the concrete when finished will not be of sufficient consistence to bear the blow of the mallet necessary to consolidate it, and it will not harden sufficiently quick after being laid to enable the core around which the pipe is formed to be withdrawn, and the work to proceed rapidly. On the other hand, if sufficient water be not added, the concrete will be pulverulent, and will not hang together while the pipe is being formed. The mortar, or moistened mixture of sand and cement thus formed, is then thrown upon the gravel or pebbles and the whole mixed together; this should all be done as rapidly as possible, and the concrete made use of immediately. It is best to make but small portions of concrete at a time, as it very rapidly deteriorates when exposed to the air before being used; a bushel or two of concrete is sufficient to make at once, and all that is made at a time should be used, and not left to the next day.

Trenches.—The trenches which are to hold the concrete pipes should be laid out by means of a surveyor's or mason's level, or by any other method which will insure a fall in the pipe from source to outlet; a very slight fall will be sufficient to insure the passage of the water, but to prevent the accumulation of sand, leaves, &c. upon the bottom of the pipe, a considerable fall is desirable; at least one or two feet in one hundred, and more if the ground allows it. It is also requisite that the fall be continuous, that is that there be no portions of the pipe level, as in this case sediment would be likely to accumulate in the level portion and stop the pipe up. The trenches should be dug one to three feet below the surface, or sufficiently low to avoid the influence of frost; they should also be formed wedge-shaped at the bottom, to economize material and form a support for the sides of the fresh-laid pipe when the latter is made by ramming the fresh concrete round a wooden core.

Forming the Pipes.—If the pipes be small, or of an interior diameter not exceeding one and a half inches, they may be formed at the bottom of the trench where they are to lie, over a core which is to be gradually withdrawn as the pipe progresses. For this purpose a roller or core is to be turned of hard wood, perfectly true and of uniform diameter, 15 to 18 inches in length. Commence by throwing in a trowel full of concrete, which settle by light blows of a mallet, and on this place the prepared wooden core, around which more concrete is thrown, which should be consolidated by repeated blows with the mallet; thus proceed settling the concrete round the core until about a foot of the pipe is formed, then carefully retract the roller a few inches and make a small addition to the pipe, always withdrawing the core as the pipe progresses, doing this with care that the fresh-made pipe may not be broken or cracked in the operation, and remembering that when the work is intermitted and again resumed, the new concrete should be well joined with the old to prevent leaks.

It is obvious that the concrete should be sufficiently stiff to support itself after the core is withdrawn and until it hardens, which will require more or less time according to the quality of the cement. In this manner by constantly withdrawing the core and by adding fresh concrete, a continuous pipe may be formed of indefinite length, which in durability will surpass any other which can be laid at the same cost. Cloudy, wet weather is very favorable to this part of the operation; if hot or cold weather be chosen, the pipe as fast as it is formed should be covered with a thin layer of earth, as a protection from sun in one case and frost in the other.

Should a larger water passage be required for purposes of irrigation or drains, the pipe may be constructed by forming large bricks of concrete one foot or more long and $1\frac{1}{2}$ to 2 inches thick, by ramming the fresh-made concrete into moulds upon a flat clean barn or cellar floor, which bricks, after remaining a day or two to harden, may be built into a drain and covered immediately with earth. The mould, which should flare very slightly to facilitate the loosening of the brick, is constructed without top or bottom; it is then placed upon a smooth floor and the concrete rammed into it; the mould is then carefully raised, leaving the brick upon the floor, where it remains until sufficiently hard to be laid in the drain or piled up, until required. The mortar in this case may be made more moist than where the pipe is formed by ramming the concrete round a core.

For a drain 6 inches square in the clear, two sizes of bricks would be required, one for the top and bottom 10 inches wide by 12 to 18 inches long, and another for the sides 6 inches wide by a similar length and 2 inches thick.

At the commencement of the pipe or drain, an iron grating may be placed to exclude leaves, sticks, and small animals; and a basin or box sunk at the head of the pipe, one foot or more below its level, to receive the water before it flows into the pipe, will catch all the sand before it reaches the pipe, and may be cleaned out as often as necessary.

PENNSYLVANIA FARMING.—IMPROVED HAY-FORK.

East Brandywine, Chester Co., Pa., 10*th mo.*, 1849.

Esteemed Friend:—Feeling a warm interest in whatever relates to the Patent Office and its annual Reports, I most willingly attempt a compliance with the request contained in your Circular, though much doubting my ability to contribute any thing which may be useful.

We have had a very pleasant season in this part of the State, and the crops are all remarkably fine. I hear of no complaints, except towards the middle of the State, where the drought has to some extent injured the corn and grass. Our agriculture consists of three main branches, viz: raising grain, dairying, and feeding cattle.

More or less grain is raised by each farmer, and most farms are divided into 6 or 8 inclosures. One field (generally grass-sod) is turned down for corn, which is usually planted in hills 4 feet each way, and 4 stalks to the hill. It is afterwards well tended with the cultivator or corn-plough, and in this way we raise on our best lands from 50 to 100 bushels per acre. Seventy-five is considered a good crop. The following spring this field is put in with oats, which on good land grow very luxuriant. When the oats are taken off, the field is manured, and put in with wheat, and at the same

time timothy and clover seed are sown. It remains in grass until its time comes to be broken up in the regular rotation.

In former years there was a large portion of the land in this part of the State rendered comparatively barren by a slothful and imperfect system of farming; but under a more practical and scientific course of management, these vestiges of bad husbandry are fast disappearing; and it is truly gratifying to see land once comparatively worthless, now bearing heavy crops. A free use is made of lime, which costs ten cents per bushel at the kiln. From my own experience I am satisfied that deep ploughing and a moderate use of lime and plaster cannot be too highly recommended. But above all, attention should be paid to the careful saving and application of stable manure: for I am fully persuaded that the fertility of land may be easily maintained by the latter means alone.

We have here a very intelligent and enterprising population, composed of various denominations, living in perfect toleration and free social intercourse. A large number of manufactories have been established of various kinds, making a ready market for the products of agriculture.

I cannot conclude without attempting to bring to thy favorable notice a simple contrivance, lately introduced into our State, for pitching hay by horse-power. I put one up before harvest, and think it possesses great merit as a labor-saving implement. It consists of 3 pulleys, about 85 feet of ¾ inch rope, and a large fork. The head of the fork is about 28 inches in length, and 2½ inches square, made of good wood. The handle should be 5½ feet long—morticed into the head, and secured from splitting by a strap of iron clasped around the head, and extending some distance up the handle. The prongs should be made of good steel, 20 inches long, ⅝ inch thick at the head, and tapering down to a point. They should be set in the head at equal distances apart, and with a burr attached, to screw them up tight. Two ropes, or iron rods, (fig. 1. *a, a,*) about three feet long, fastened to the ends of the head, are brought together at *b*, to which a pulley is attached. A

Fig. 1.

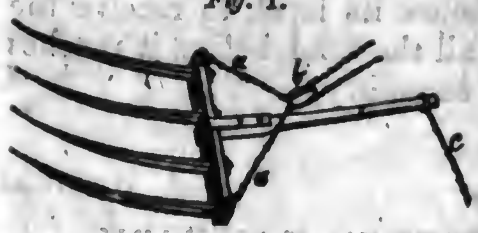
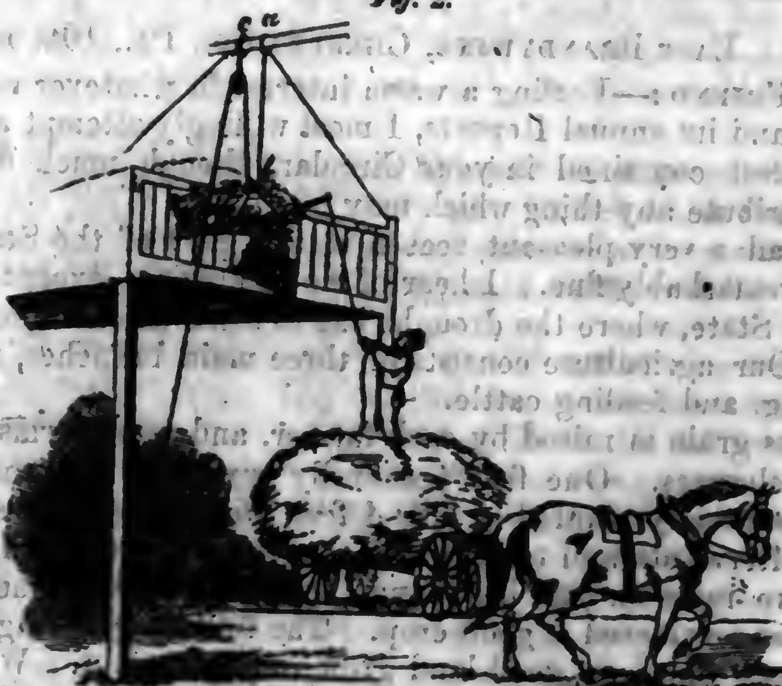


Fig. 2.



small rope, *c*, is also fastened to the end of the handle, in length to suit the height of the barn, by which the fork is kept level as it is raised to the top of the mow, where the hay is discharged by slackening the rope. In adjusting the machine, let one end of the main rope be attached to the peak of the rafter, about 3 feet over the bay, as at *a*, (fig. 2,) thence let it pass through the pulley *b* on the fork, then through the second pulley, *c*, and then through the third pulley, *d*, fixed to the lower part of the door-post, to give a level draft for the horse. One person on the load, one or two in the mow, and a boy to lead the horse, constitute the force necessary to unload hay in this manner; and, though a simple machine, it will be found to save much hard labor.

The horse-rake, and machines for threshing, and other purposes, have greatly lessened the labors of the farmer. But we greatly need some simple contrivance to mow grass by horse-power: all that have been invented are too complicated, and liable to get out of order. These remarks are all kindly submitted to thy better judgment and discretion.

Respectfully thy friend,

MORDECAI LARKIN.

Hon. Thomas Ewbank,
Commissioner of Patents.

PROPER TIME FOR FELLING TIMBER.

Concordville, Pa., *Nov.* 18*th*, 1849.

Esteemed Friend:—Through the "Delaware Co. Institute," I have received one of the circulars from the Patent Office, and I have noticed with surprise, that in all the valuable reports from this office, I have seen nothing said on the important subject of the *proper season for felling timber*, to secure its strength, durability, and other good qualities.

During an experience of more than forty years, as a plain, practical farmer, I have taken much interest in ascertaining the best season for felling timber, and I now state with confidence, that fencing timber, such as all kinds of oak, chestnut, red-hickory, and walnut, cut from the middle of July to the last of August, will last more than twice as long as when cut in winter, or common barking time in spring.

For instance:—cut a sapling, say five or six inches in diameter, for a lever, in the month of August, and another of similar quality and size in winter or spring. I *know*, if the first is stripped of its bark, (which at that time runs well,) it will raise, as a lever, at least *twice* the weight that can be raised by the latter.

Another great advantage derived from felling timber in the last running of the sap, (the time above specified,) is, that it is neither subject to dry-rot, nor to be injured by worms; while oak cut at this season, if kept off the ground, will season through two feet in diameter, and remain perfectly sound many years; whereas, if cut in winter or spring, it will be perfectly sap-rotten in two years.

For ship-building and other purposes where great expense is incurred in construction, the immense advantage of preparing the timber at the proper season must be evident to all.

I have no doubt, a ship built of timber cut between the middle of July

and the last of August, would last nearly twice as long as one built of timber cut at the usual time; and would bear infinitely more hard usage, as the timbers season more perfectly and are far harder.

A few years since, one of the large government ships, built in Philadelphia, of the very best materials, but several years in construction, when ordered to be finished and launched, was found upon inspection to be entirely worthless in many of the timbers, (though kept under cover,) from dry-rot.

In all my building for many years past, with large timbers of white and other oak, this has never occurred, nor are they subject to be worm-eaten.

Even firewood cut at the proper season is worth from 30 to 50 per cent. more than when cut in spring or winter.

If the above facts are considered of any value, please make use of them, and if those learned in such matters can assign any plausible reason for them, the theory may be of value to others, as well as thy friend.

With much respect,

WILLIAM PAINTER.

Hon. THOMAS EWBANK,
Washington, D. C.

CHEMICAL PROPERTIES OF MILK AND BUTTER.

(BY WILLIAM PERRY FOGG.)

MODERN Chemistry has thrown much light upon this very important branch of rural industry. Of all agricultural products, none is more valuable, more widely diffused, or more difficult to dispense with, than *milk*, and the butter and cheese manufactured from it. Many elaborate and careful experiments have been made by Boussingault in France, Dr. Thomson and other chemists in England, with the view to test the quantity and quality of milk produced by animals fed on different kinds of food. These experiments have elicited many important facts of great value to the dairy farmer; but much remains to be done, before this subject can be fully cleared up.

It is to be regretted that no experimental researches on the food of animals have been made and published in our own country; and that, when a large portion of the incomes of farmers is derived from the products of the dairy, this subject is so little understood. The economical production of milk by means of the machinery which nature has provided should be carefully studied, and reduced to a science. This article, which constitutes so large a proportion of human food, should be considered a *legitimate manufacture;* and improvements in the *machinery,* or the animals which elaborate it, would add millions to the agricultural wealth of the country.

Composition of Milk.—The component parts of milk in all animals, both herbivorous and carnivorous, are the same. It differs only in the proportions of its principal ingredients. The following table exhibits the composition of the milk of different animals, in its ordinary state, as found by Profs. Henry and Chevallier:

	Cow.	Ass.	Goat.	Ewe.
Casein, (cheese)	4.48	1.82	4.02	4.50
Butter	3.13	0.11	3.32	4.20
Milk sugar	4.77	6.08	5.28	5.00
Saline matter	0.60	.34	.58	.68
Water	87.02	91.65	86.80	85.62
	100.00	100.00	100.00	100.00

From the above it will be seen that asses' milk contains much less butter and cheesy matter, than that of the cow. It is probably this circumstance which, from the most remote times, has recommended it to invalids as a light and easily digested drink.

The richness, or proportion of butter and cheese contained in milk, is well known to depend in a great degree on the food of the animal, the period of gestation, and the time of giving the milk. That taken last from the cow, during the same milking, usually contains much the largest proportion of butter. The experiments of Dr. Thomson, of Glasgow, on the milk-producing properties of different kinds of food, are very interesting. His treatise on the "Food of Animals" should be in the hands of every dairy farmer; for to him it is a matter of the highest importance to understand the cheapest and most effectual mode of feeding animals, so as to produce the greatest quantity of rich milk.

The ordinary temperature of new milk is from 65° to 70°. To the naked eye it seems a pure white liquid; but when viewed through a microscope, an infinite number of minute globules appear, which contain the oily part, or the butter. When the milk is set away in the dairy, these oily particles, being the lightest, gradually rise to the surface, and form the cream. But when milk is exposed to the atmosphere, the *oxygen* absorbed by it slowly changes the milk sugar into what is called *lactic acid.*

This acid causes the casein or curd to coagulate, prevents the further separation of the cream, and the milk becomes sour. The curd of sour milk is always found to contain more or less butter; sometimes as much as two per cent., or one-half the whole quantity contained in the milk. This arises from the fact that the lactic acid is formed before all the buttery particles have had time to rise to the surface. Hence, the longer we can keep milk sweet, the more cream we can obtain. Now it is impossible to prevent the change of the sugar into lactic acid, but we can in some measure counteract its effects, by adding to the milk a substance that will absorb the acid as it is formed. *Carbonate of soda* is the substance which experience has proved best adapted for this purpose. It is perfectly innoxious, and when pure, imparts no disagreeable flavor to the milk or butter. A small quantity, say half a teaspoonful, dissolved in water, and mixed with four quarts of milk, will keep it sweet for four or five days; thus allowing all the buttery globules to rise, and often doubling the quantity of cream. In very warm weather, more than the above quantity of soda is required. In order that the cream or butter may have no unpleasant taste, it is essential that the soda be pure; and especially free from *sulphate of sodium,* (glauber salts,) which it often contains. To test its purity, dissolve a little in water, and then add sufficient vinegar to make it effervesce. Put into this a piece of silver, as a teaspoon, for instance, and if, after remaining a short time, it

retains its bright appearance, you may depend upon the soda as pure; for if it contains the least particle of *sulphur*, the silver will become tarnished.

The souring of the cream is caused by the acid formed in that portion of the milk that adheres to the oily particles; and can be prevented, or rather retarded, by the process above described. Instead of soda, other alkalies, as the *carbonate of magnesia*, or a few drops of *ammonia*, are sometimes used.

From 48 to 72 hours are required completely to separate the cream from the milk. When this takes place, the liquid loses its white color, and acquires a blueish appearance, well known as the characteristic of skimmed milk.

In Italy milk is often preserved for a long time by evaporating it to dryness at a gentle heat. It is then known by the name of *latteina*. As eighty-eight pounds in every hundred of milk is pure water, which escapes during evaporation, we obtain by this process about one pound of dry matter to every four quarts of milk. This can be preserved for any length of time, and when dissolved in water is said to possess all the qualities of most excellent milk. Another simple process, by which milk can be kept sweet for six months or more, is to put it into bottles, which, after being well corked, are set in a vessel of water, and gradually raised to a boiling heat; they are then taken out and set away in a cool place until wanted for use.

Composition of Butter.—Butter is an oleaginous, fatty substance, formed by the union of the oily particles contained in the milk. These exist in the form of minute globules, each of which is inclosed in a thin film, or coating, of a substance resembling casein, which can easily be detected with a microscope. When the temperature of the cream or milk is slightly raised, the fatty globules press towards the surface, break through the delicate covering which envelopes each, and the fat exuding collects together through mutual attraction, and constitutes butter. The same result is attained by beating or violently agitating the cream, as in the ordinary process of churning. In all cases the cream becomes sour before the butter is formed. It is supposed by some that the lactic acid attacks and gradually dissolves the capsules, or envelopes of the oily globules, and as these thin off and burst, the buttery particles run together into a mass. This union is purely mechanical; but a chemical action always takes place in changing the sugar into lactic acid. Thus the cream must either be allowed to stand until it sours, or else it becomes sour during the process of churning. In the latter case it is often necessary to raise it to a higher temperature; and it is sometimes found that to add a little sour milk, or some other acid substance while churning, will hasten the formation of the butter. By churning the cream sweet you obtain butter of a more delicate flavor, but in less quantity. In many places all the milk is churned, under the impression that in this way more butter is obtained than from the cream alone. This cannot be the case when the cream has been properly separated from the milk; and besides, in churning the whole of the milk, it is impossible to separate all the butter, from the difficulty of acting equally upon and keeping in motion so large a body of fluid. In the vicinity of towns, where there is a ready sale for buttermilk, it may perhaps be good economy to churn the whole milk; but in the country, where there is no market for buttermilk, it is undoubtedly the better plan to churn only the cream, while from the skimmed milk a marketable cheese can always be manufactured.

The proportion of cream and butter produced by a given quantity of

milk has been found by Prof. Johnston, as the result of numerous trials, to average as follows:

Milk.		Cream.	Butter.
18 to 21 lbs. / 9 to 11 qts.	yield	4 lbs. / 2 qts.	1 lb.

The proper temperature of cream in churning is about 55°, but when the whole milk is churned, it should be 8° or 10° higher. If it be raised too high, the butter comes quick, but is usually soft and white. This is often the case in warm weather, and the only remedy is to use ice, or to keep the milk in a very cool dairy. To insure good hard butter at all seasons of the year, particular attention should be paid to the temperature of the cream: and on a well-managed dairy farm, ice should always be accessible in summer, by which, even in the hottest weather, the cream can be brought down to the proper temperature.

In churning, the motion should be regular and moderate: slower in warm weather than in cold, that the temperature may be uniform throughout the whole mass. The hardest and finest quality of butter has been obtained after churning at the above temperature (55°) from an hour and a quarter to an hour and a half. The following experiments, made by Mr. Ballantyne, of Edinburgh, will illustrate this. The quantity of cream at each churning was eight gallons:

No.	Temperature.		Time in churning.	Quantity of Butter per gallon.	Quality of the Butter.
	Of the Cream.	When Butter came.			
1.	56°	60°	1½ hours.	2 lbs. 1 oz.	Inferior. White, and softer than No. 2.
2.	52°	56°	2 "	2 " 0 "	The flavor and quality of these two could not be surpassed.
3.	52°	56°	2 "	2 " 0 "	
4.	65°	67°	½ "	1 " 15 "	Soft. White and milky.
5.	50°	58½°	3 "	1 " 15½ "	Good—but evidently injured by long churning.
6.	58½°	57½°	1½ "	2 " ½ "	Most excellent—high in flavor and color, and solid as wax.*

It is well known that the food of the cow influences both the quantity and the quality of the butter. When the cow is fed on hay or dry fodder, the butter always comes the hardest: and it is said that the orange carrot fed to milch cows will impart an agreeable flavor, and a rich, yellow color to the butter. But to add the juice of the carrot after the butter is made, as is sometimes done to give it a saleable color, is by no means to be commended, as it introduces an element that promotes its rapid decomposition.

How to preserve Butter sweet.—In the first place, let it be worked as free as possible from the buttermilk. The imperfect manner in which this is done is the principal cause of its becoming rancid so soon.

By analysis, ordinary butter was found to contain:

Water	12.79
Casein	.94
Oil	86.27
	100.00

* See Lectures on Agricultural Chemistry and Geology, by Prof. Jas. F. W. Johnston, p. 556.

Here the water and casein, or curd, mingled with the butter, constituted over 13 per cent., and by fermentation would soon destroy the delicate flavor, and produce rancidity throughout the whole mass.

There is a mode of preserving butter fresh for any length of time in use in India, where, when thus prepared, it is called *ghee*. This is to reduce it to a pure oil by boiling it in an open vessel until all the water is removed, which is shown by the cessation of violent ebullition. The liquid oil is then allowed to stand for a short time, until the curd has subsided, when it is strained into bottles and corked tight. When wanted for use it is gently heated and poured out. It is said that it can thus be preserved for years, and that prepared in this way is the best form to use this substance for sauces.*

In Holstein, where very choice butter is made, they pack it in firkins made of beech-wood, charred on the inside. The firkins, jars, or kegs should in all cases be air-tight, and the butter packed as closely as possible. Then, after sprinkling the top with salt, let a thin layer of powdered charcoal be spread over, the more effectually to exclude the air, and also to absorb those gases the tendency of which is to hasten decomposition. When thus packed, after being properly salted, it will keep sweet for a long time, even in warm climates. The salt should always be of the purest description. Much butter is spoiled from using salt containing *sulphate* or *chloride of lime*. When coarse salt is used, the latter, which adheres to the surface of the crystals, can be removed by pouring upon it a little warm water, and then allowing it to drain off.

It may not perhaps be known to all, that rancid butter can be restored, and rendered sweet by a very simple process. This is to work it thoroughly in cold water, often changed, and after pressing out the water, salt it anew, and add a little sugar, say half an ounce to the pound. It will thus be rendered much more palatable, although it may not entirely recover that delicate flavor peculiar to new and sweet butter, which, once lost, can never be restored.

In conclusion, I need only refer to the fact, that extreme cleanliness is an essential requisite in every thing that pertains to the dairy. Vessels of such materials only should be used to contain the milk as will readily admit of being thoroughly cleansed. The skillful dairy-woman well knows the necessity of washing and *scalding* these every time they are used. A very small quantity of putrescent milk adhering to them will act as a *leaven*, and cause fermentation in any fresh milk exposed to its influence. Cream possesses, in a remarkable degree, the property of absorbing any unpleasant odors that may exist in the atmosphere. The air of the dairy should, therefore, often be renewed, and ever be kept pure and sweet.

* Experimental Researches on the Food of Animals, by Dr. R. D. Thomson, p. 64.

PHILADELPHIA BUTTER—SWEET-SCENTED VERNAL GRASS.

PHILADELPHIA, *October* 31, 1849.

SIR:—I wish to invite your attention to a subject relating to pasturage and the products of the dairy. It has already been laid before the public, but this so partially and imperfectly, that it will still be found by most persons invested with novelty, and as I believe fraught with important bearings upon agricultural interests.

Philadelphia butter enjoys a widely extended reputation for its peculiarly high yet delicate flavor, well known to all who have had opportunities of tasting it. Good butter produced in this vicinity is always to be found in the Philadelphia market, but it is only during the spring that it possesses in greatest perfection that delicious flavor to which I here particularly refer. This superior flavor, like that distinguishing the Epping and Cambridge butter of the London market, has been very naturally ascribed to something eaten by the cows producing it. But what this *something* is has been a subject for vague speculation, and never yet defined or specified so as to enable persons in other localities to avail themselves of it for the improvement of their own pastures and dairy products.

Extensive observations and many experiments made and continued through many years have convinced me that the proximate source of the high flavor of our Philadelphia May butter is the *sweet-scented vernal grass*, abounding in the old pastures, fields, and meadows of the adjacent counties. Some of the facts and reasons upon which I found this conclusion are the following:

1st. In the dairy region around Philadelphia the sweet-scented vernal grass, with its peculiar vanilla-like fragrance, constitutes the predominant spring herbage on all the pasture fields and meadows left several years unploughed. The longer the pastures have been left unbroken, the greater the proportion of the vernal grass, and the higher the flavor of the butter produced from the cows fed upon them. Many of the meadows and pasture fields have remained ten, twenty, thirty, and more years unbroken by the plough. In such cases the sweet-scented vernal grass affords almost the exclusive spring herbage.

2d. The high flavor continues in the butter during the development of this grass, and invariably declines with the maturing of the seeds, after which the stems become dry and hard, and the cattle push them aside in search of fresher and greener herbage.

3d. The sweet-scented vernal grass is shown by chemical analysis to contain an aromatic essential oil, of which *benzoic acid*, or flowers of benzoin, is the base.

This aromatic principle is abundant, and can be readily obtained by distillation, furnishing a delightful perfume and source of flavor. As the milk of all animals is so very susceptible of acquiring disagreeable tastes from substances eaten, such as garlic, turnips, &c., it is natural to infer that it may likewise be imbued with agreeable flavors, when the proper agents for such a purpose are presented in the food.

4th. That the *benzoic acid* is the principal agent in producing the peculiarly agreeable flavor of butter made from pastures abounding in the sweet-

scented vernal grass, I have rendered probable, if not a demonstrated fact, by several experiments in which the flowers of benzoin given to cows imparted to the butter made from them the characteristic flavor. In such cases 20 or 30 grains of the benzoin were given twice a day, previously dissolved in hot water, which was stirred into some flour or meal, and then mingled with the customary mess. The cows receive not the slightest injury from this or even a much larger quantity of the benzoin.

The sweet-scented vernal grass, called by botanists *anthoxanthum odoratum*, is a native of Europe, from whence, at an early period of our settlement, it has doubtless been introduced into the vicinity of Philadelphia, its seeds having probably been blended with those of other grasses. It has been long naturalized, and now disputes the right of soil with the common green grass, and never yields possession, but becomes more and more predominant until the sod is destroyed by the plough, after which it clings to the borders of the field, along the fences, and hedge-rows. When, after a rotation of grain crops, the ground is left undisturbed by tillage to be again covered with greensward, the vernal grass reappears springing from the old seed left in the earth. Though seldom sown designedly in this part of the United States, it is often sown in England, where it constitutes a part of the growth of most permanent pastures, growing in nearly every kind of soil, but attaining its greatest perfection on the deep and moist, loving shady places, such as the skirts of woods. The sweet odor by which English hay is often distinguished is chiefly derived from an admixture of vernal grass. Although when alone it is not distinguished very highly as a hay grass, still its early growth and hardiness, with the superior nutritive properties of its aftermath, give it high claims in the composition of all permanent pastures. In England it comes into flower about the middle of April, and in southern Pennsylvania about the middle of May, the seed ripening in both countries about the second week in June. It is worthy of remark, that in the moist climate of England this grass continues throwing up flower-stalks till the end of autumn, while in Pennsylvania the efflorescence is confined to spring. As the development of the aromatic qualities is mainly confined to the period of efflorescence, this fact may explain why the period of highest flavor in Philadelphia butter is so limited.

The question might be very naturally asked: If the sweet-scented vernal grass communicates to spring butter the high and delicious flavor we have referred to, why is not this flavor imparted in winter when cows are fed on hay cut from meadows known to contain this grass? The answer I would give is as follows: The principal and almost exclusive hay-grass of our section of country is timothy, which, with red clover frequently combined, matures and is mown long after the sweet-scented vernal grass has dried its stalks and lost its distinguishing fragrance. Could the vernal grass be sown alone, or blended with other grasses maturing at the same time, and the hay all mown at the stage of perfect efflorescence and highest fragrance, there is little doubt that butter made from cows fed upon it would manifest more or less of the fine flavor at other times than in the spring. I think it proper to remark that the milky products of cows fed on pastures where the sweet-scented vernal grass abounds, instead of always possessing a delightful flavor, are sometimes found imbued with a most disagreeable one, proceeding generally from weeds so often existing in pastures. In southern Pennsylvania, garlic, and especially that nauseous and troublesome plant commonly called the "ox-eye-daisy," a species of wild camomile, (*Chrysanthemum leucanthemum*,) are very often nipped by cows when the herbage is short or scarce. In such cases all the agreeable qualities that might otherwise have been derived from the vernal grass are not only neutralized, but overpowered by the disagreeable tastes imparted by the bad company with which it is associated. I consider the sweet-scented vernal grass worthy the attention of all farmers desirous of possessing the means of obtaining butter and other dairy products in the highest perfection, and of having in their fields and meadows one of the earliest, if not the very earliest pasture grass known.

But to these advantages, great as they are, may, I think, be added others of no small importance; one of which is the capacity to confer a fine flavor upon the meat of stock grazed upon a species of herbage fraught with a high aromatic principle. Such advantages have, from time immemorial, been the inheritance of people in certain localities, where they were originally indebted for them to chance, as for example with those residing in the vicinity of Philadelphia, few if any of whom are aware that there exists in their pastures any grasses not common to those of other places. To identify the immediate agent from which such advantages are derived, is to remove them from the uncertain control of accident, and place them at once at the disposal of all.

A description of the grass, the merits of which I have been describing to you, may be found in the Farmers' Encyclopedia, (Philadelphia edition for 1850,) under the head of *Anthoxanthum Odoratum*, figured in plate 6, *a*.

Very respectfully,

Your ob't servant,

G. EMERSON.

HON. THOMAS EWBANK,

Commissioner of Patents.

DAIRIES.

(From the Trans. of New York State Agricultural Society for 1849.)

Committee—B. P. JOHNSON, JOSEPH CAREY.

THE importance of the dairy interest is every year becoming more and more apparent, and increased numbers of our farmers are turning their attention to it. It has been the object of the society to perfect the manufacture of butter and cheese, and thus secure to our dairymen, not only the highest price for their products, but the best markets in our own country and in foreign lands. The committee, from the information they have obtained from various portions of our State, from the most intelligent as well as the most successful dairymen, are satisfied that the laudable objects of the society have, in a measure at least, been accomplished. The quality of butter and cheese is yearly improving, and although very many of our dairymen are sadly deficient, yet the fact that every year witnesses an addition to the number of excellent dairies is in the highest degree encouraging, and should stimulate the society to continue and extend their efforts in this direction. The *keeping* qualities of much of our butter have been established, so that the purchaser is no longer compelled to make his selection from a *single locality*, but has the choice of hundreds of dairies, from which

he may select his butter, that will stand the test of climate. It is in the highest degree inexpedient to send inferior butter or cheese to foreign markets. Loss to the shipper is invariably the result. The inferior butter sent from this country to England is classed as grease, and brings no higher price than what its designation implies, while butter made as it should be commands a remunerating price. So also with cheese.

Our best Herkimer dairies, whose character is as well known in the London and Liverpool market as in New York, will command within a few shillings sterling the price of the best English dairies, and frequently the same price, while inferior cheese is sold from ten to fifteen shillings sterling per 100 lbs. less. But this is true not only of the foreign market: a difference to nearly the same extent exists here, and the poor and indifferent article sells at a very diminished rate from that made in prime and choice dairies. It is then important to press upon our dairymen the necessity of care and attention in the preparation of their butter and cheese. There is no inherent difficulty in producing a good article in most parts of this State, and if the requisite knowledge is acquired, and suitable preparations for making secured, the dairymaid need not make an inferior article, and if she does, the fault must rest upon her.

The exhibition at the annual fair, as well as the samples on exhibition at this time, are of such a character as to satisfy the most fastidious; and what has been done in these cases may be done in a thousand others, if the same attention and skill are directed to the object.

The society has endeavored to ascertain the breed of cattle best adapted to the purposes of the dairy, but as yet cannot learn from the competitors that there can be any decision as to particular breeds in this State which are preferable. From an examination of the statements of all the competitors at Syracuse, eleven in number, who referred to their cows, *nine* were of what is called the *native* breed, and *two* mixed more or less with *Durhams* or short-horns. In the trial of five cows for thirty successive days, it will be seen, Mr. Holbert's five cows made, in thirty days, from 23d May to 21st June, 264½ lbs. of butter, averaging over 1¾ lbs. per day each. His cows were native, with a slight mixture of Durham—what proportion is not stated. Mr. Nelson Van Ness, of Westfield, made 221 lbs. in thirty successive days, averaging nearly 1½ lbs. each per day. His cows are stated to be the common native breed. The only trial which has been made in this State with pure short-horn cows, as to their dairy qualities, which has come to our knowledge, was made by George Vail, Esq., in 1844. He had six cows, from whose milk, in thirty successive days, he made 262 lbs. 9 oz., averaging 43 lbs. 12 oz. per cow—not quite 1½ lbs. per day. One of the cows, whose milk was kept separate, made 52 lbs. 9 oz. of butter, being 1¾ lbs. per day. Mr. Vail has continued the manufacture of butter from his herd of short-horns since that time, and we believe with satisfactory results.

As a matter of interest, doubtless, to many, we give a statement of the quantity of milk and butter from some of the most celebrated dairy cows. There are few persons conversant with our agricultural journals, but what have heard of the celebrated Cramp cow, owned in Lewes, England, of the Sussex breed, which, during four years, from 1805 to the end of 1808, yielded the extraordinary amount of 23,559 quarts of milk, producing 2132 lbs. of butter! The largest average product which has been stated by any writer in whose practical experience confidence can be placed, is that of Mr. Aiton, who rates the yearly average return of the best Kyloes at 4000

quarts within 300 days, or until they were dry.—(*British Husbandry*, vol. 2, page 403.)

First 50 days, 24 quarts per day	....	1,200
Second " 20 " "	....	1,000
Third " 14 " "	....	700
Fourth " 8 " "	....	400
Fifth " 8 " "	....	400
Sixth " 6 " "	....	300

He cites an extensive Ayrshire dairyman, who says: "that he would not keep a cow on his farm that did not yield her own value, or her weight in sweet-milk cheese every year." He admits, however, "that many cows will not yield more than half that quantity—4000 quarts: and that probably 600 gallons in the course of a year may be about a fair average of the Ayrshire stock."—(*Survey of Ayrshire*, p. 464.) The average quantity of milk yielded by dairy cows in England is stated, in three counties, as follows:

In Devon	12 quarts per day.
Cheshire	8 quarts per day.
Lancashire	8 to 9 quarts per day.

Five short-horn cows, of the ordinary quality of that breed, are stated to have given in one year as follows:

One which did not go dry at all	4,857 wine qts.
One dry eight weeks	3,985
One dry four weeks	3,987
One dry four weeks	3,695
One dry eighteen weeks	3,383

These cows were in summer at grass, and in winter on hay and turnips, with two months on hay alone.

"A large dairy of long-horns and short-horns, at the late Mr. Curwen's farm, of Workington Hall, gave upon an average of four years, about 3700 quarts each."—(*Survey of Lancashire*, p. 547.) In some trials made at Bradly Hall, the seat of the Earl of Chesterfield, in Derbyshire, it was found that during the height of the season the milk and butter produced per day by different cows was as follows:—

By the Holderness	7 galls.	1 qt.	38½ oz. butter.
" Ayrshire	5 "		34 "
" Alderney	4 "	3 qts.	25 "
" Devon	4 "	1 pt.	28 "

But this only lasts for a short time, and such extraordinary supplies soon fall off; in fact, the nature of the land, the oldness of the pasture, the age of the stock, and the state of the season, have each a separate influence. Generally speaking, a fair annual product from each cow in good condition may be considered as about 160 to 180 lbs. of butter of superior quality, and 350 to 400 lbs. of whole milk cheese, with a small quantity of whey butter.—(*British Husbandry*, vol. ii. p. 406.)

The most productive cow in butter the late Mr. Colman found in Great Britain, was a *North Devon cow*, which produced for several weeks in succession 21 lbs. of butter per week, without extra feed. The North Devon cows of Lord Leicester's tenant, Mr. Bloomfield, average 4 lbs. of butter

per week through the year, = 208 lbs.—(*Col. Tour,* vol. ii. p. 324.) Among the most extraordinary cows in this country, we give the following from Massachusetts, which we take from the Report of the Committee on the Dairy in Essex Co., 1849.

Date.	Name.	Place.	Weekly Produce.	Length of time.
1826	Oakes cow	Danvers	16 lbs	16 weeks.
1824	Nourse "	"	14 "	16 "
1828	Sanderson	Waltham	14 "	16 "
1830	Homers	Bedford	14 "	12 "
1830	Hazeltine	Haverhill	14 "	12 "
1830	Bassett	Northampton	15 "	12 "
1845	Buxton	Danvers	16 "	12 "

These cows show a product of more than two pounds per day each, for a period of three months. John Hare Powell, of Pennsylvania, had a short-horn cow which produced in 3 days 8 lbs. 13 oz. butter, or at the rate of 20½ lbs. per week.

We give the amount of butter made from several cows in this State:—

George Kier, East Bloomfield, Ontario Co., from his native cow, 19 lbs one week, and 16 lbs. for two succeeding weeks.

Franklin Comstock, of Kirkland, Oneida Co., ¾ native, ¼ Durham, ten-year old cow, made 17 lbs. 5 oz. butter in one week.

C. W. Taylor, Truxton, Cortland Co., 58 lbs. 6 oz. butter in 4 weeks, about 14 lbs. 6 oz. per week.

Charles D. Miller, of Peterboro', Madison Co., made in one week from a cow of his, 20½ lbs. of butter; and in a very unfavorable week in June, 15 lbs. This cow was an enormous feeder. Her milk weighed at night has been found to average 34 lbs.

John Lossing, Albany; a short-horn cow, in 7 days made 14 lbs. of butter, besides the milk and cream for a family of 5 persons.

Philip Van Benscoten, of La Grange, Dutchess Co., in 1844, from 5 cows in 30 days made 227 lbs. of butter, averaging 45 lbs. 6 oz. to each cow.

George A. Mason, of Jordon, Onondaga Co., in 30 days made 67½ lbs. of butter from the milk of one cow; during the first 14 days, the average was 2½ lbs. per day, and it is believed it would have continued the same during the trial had not the weather proved unfavorable.

P. H. Schenck, of Matteawan, Dutchess Co., made 15 lbs. of butter per week from a polled cow. In 21 days he made 65½ lbs. of butter, or upwards of 2½ lbs. per day; and on one day, from 15½ quarts of milk he made 8 lbs. 8 oz. of butter.

This list might be extended much further; but it is sufficient for our present purpose. By a reference to the census of 1845, it will be found that the average product of dairy cows in this State, as returned, was, by estimation, in butter about 90 lbs. per cow, and cheese about 110 lbs. By reference to the Transactions of the Society, 1846, p. 130, it will be seen that the average product of one dairy in Herkimer was 650 lbs. cheese per cow, for three successive years; and many dairies, in that and other counties, now average, it is believed, 500 lbs. per cow. The average amount of butter from Mr. Clapp's dairy, it will be seen, is 170 lbs. per cow, and several counties are reported in the county reports, exceeding 200 lbs. From

a comparison of the yield of butter from particular cows, and the general estimate for the State, it is apparent that our dairymen have much yet to do, to obtain what they should from their dairies. But we are satisfied that there is an advance making each year, from the information we are receiving from different dairy districts in our State, as well as from our own observation.

The *Ayrshire* breed of cattle have long had a reputation as to their superiority for the dairy, and as this breed is introduced to some extent in this and other States, it is believed that an account of the breed, and some observations on the proper management of cows intended for the dairy, as well as on dairy husbandry generally, will be useful. The remarks which follow are from an article by William Aiton, of Strathaven, Scotland, published in 1812. Mr. Aiton is quoted by English writers as entirely reliable authority.

"The dairy is suited to every species of land, (in Scotland,) except wastes that are not reclaimable. Of dairy animals: there is a degree of pliancy in animal economy, which renders many of them capable of being wonderfully changed by human industry; and that pliancy is not more conspicuous in any animal than the cow; the varieties of which, with their diversities of shape, sizes, dispositions, and capacities, are truly wonderful. The *Urus*, of Lithunia, is nearly as large as the elephant, while the *Kyloes*, of some of the Highland districts, and islands, are not much larger than the goat. The *Bison* has a mane like a lion, a beard like a goat, and a hump like the camel; but all these are laid aside when the animal is domesticated. Domestication and treatment produce change no less surprising in the dispositions of these animals. Our dairy cows are so feeble and over-fed, that they are injured by travelling even slowly, half a mile to their pasture; while those of the Tartars are used for the saddle, and in drawing carriages. These are not so many different species, but merely varieties in the breed of the same animal; and the diversity of size, shape, quality, and dispositions, are the effect of climate, rearing, and treatment. If such changes have already been made, what may not yet be effected? If a savage animal, dressed in the wild insignia of nature, has been by human industry formed into so many varieties, differing so much in aspect, size, and qualities, and fit to be converted into so many different uses, what may not yet be effected on that animal by the sagacity and industry of man? The following well-known adage, of great antiquity, respecting Ayrshire, shows that Cunningham was celebrated for making butter and cheese long before the reign of any of the Stuarts. The adage is—

Kyle for a man,
Carrick for a cow,
Cunningham for butter and cheese, and
Galloway for woo'.

"From the adage above quoted, it would appear that the particular boast of Carrick in remote times was their cows; these, however, were not of the dairy kind, but of what are now termed the Galloway breed. The dairy cows were not introduced into Carrick until 1790.

"The dairy breed of cows in the county of Ayr, having obtained a degree of celebrity beyond any in North Britain, it is desirable to trace their origin. I am old enough to remember that between 1760 and 1770, nothing of the shape or color of the present breed was to be met with in the district of

Cunningham. Some of the red or brown color might then be seen, but nine out of every ten cows in that district were at that time black; hence, all description of cows in Ayrshire were then termed 'black cattle.' The cows of that part of Ayrshire were then generally from twelve to fifteen, and few of them more than eighteen stone weight of saleable meat, when fattened, of 24 ounces to the pound. Being driven round their bare leys in summer, with horses, sheep, and young cattle, and getting no other food in winter but a scanty supply of oat-straw, with what they could collect in the fields, they had the aspect of starvelings; large, high standing horns, with deep ringlets at their roots; their hair coarse, and standing up; their skin thick, and adhering to the bones; their bones large, bodies lank; few of them yielding more than two, or at most three, Scotch pints of milk per day.

"This starveling breed of cows in Ayrshire, in the last forty years, has been gradually, and as it were imperceptibly, changed into something very different in point of size, shape, qualities, and general aspect. But though an eye-witness of the progress of that important change, and recently have made all possible inquiry, I am not able to account for it, otherwise than by greater attention to crossing, rearing, and feeding. Some have alleged, that the dairy breed of Ayrshire has come from Holland, and others have ascribed to them an English origin. I have no doubt but a tinge of foreign blood may have come into their veins; but I am confident that the breed is chiefly indigenous, and that the principal improvement upon that breed has been by better feeding and treatment. The Earl of Marchmont, about the year 1750, purchased from the Bishop of Durham several cows and a bull of the Teeswater, or some other English breed of the *same brown color*, into which the dairy stock of Ayrshire has since been changed. These were crossed with the stock of many farmers. Several cows of a brown color were introduced by gentlemen and noblemen into Ayrshire, at about the same period, from Glasgow. They were of greater size than the native breed of Scotland, and some of these having, from time to time, been carried into different parts of the county of Ayr, and being generally placed on richer pasture, and better fed than the ordinary farm stock were at that time, they yielded a greater quantity of milk, and the farmers became eager to procure calves or crosses with them, in hopes of getting similar returns from their progeny. I have not been fully satisfied as to the origin of this stranger breed; they were termed Dutch cows by some, and English cows by others. But from whatever quarter they may have come, it is from them that the brown color, now so universal in the Ayrshire dairy breed, has become fashionable. Perhaps something of the other qualities of that breed may also have descended to the Ayrshire dairy cows, by crossing with them. But I am not of opinion that the present stock of Ayrshire are either completely descended, or that their superior excellence has been entirely derived from these strangers. I am persuaded that they have been brought to their improved state chiefly by better feeding and treatment.

"As the dairy has been the great boast of Cunningham (the northern district of Ayrshire) from time immemorial, the inhabitants could not fail to discover that some of their cows yielded more milk than others. When one excelled in milking, they would look well for others of the same shape and aspect, and reject those that were different. They would naturally rear the calves of the best milkers, in hopes of their inheriting the qualities of their dams. This and better feeding would improve their stock, and their suc-

cess would stimulate them to make still greater exertions to render their cattle better and more productive. Such improvements, once begun on sound principles, could not fail to lead to most beneficial results. To procure more milk, they select the cow that they find to be most productive of that fluid, and greatly better her condition. By these means the stock is improved, and by experience and observation the farmers acquire more correct notions of the breed, and in what manner they can be rendered still more productive. It has been greatly more by these means than by importing a foreign breed, that the dairy stock of Ayrshire have attained their present unrivalled celebrity; and the farmers having become familiar with the pliancy of the animal, and the proper means of improving and rendering it productive, they will no doubt persevere in making still greater improvements.

"The shapes most approved in the dairy breed are as follows: *Head* small, but rather long and narrow at the muzzle; the *eye* small, but quick and lively; the *horns* small, clear, bended, and their roots at considerable distance from each other; *neck* long and slender, tapering towards the head, with little loose skin hanging below; *shoulders*, thin; *fore-quarters*, light and thin; *hind-quarters*, large and capacious; *back* straight, broad behind, and joints of the chine rather loose and open; *carcase* deep, and the *pelvis* capacious, and wide over the hips, with fleshy buttocks; *tails*, long and small; *legs*, small and short, with firm joints; *udder*, capacious, broad, and square; stretching forward, and neither fleshy, low hung, nor loose; the *milk* veins, large and prominent; *teats*, short, pointing outwards, and at considerable distance from each other; *skin*, thin and loose; *hair*, soft and woolly; the head, bones, horns, and all parts of least value, small, and the general figure compact and well proportioned."—(*Farmer's Mag. and Mr. Aiton.*)

"The *qualities* of a dairy cow are of still greater importance than her shape. Firmness and docility of temper greatly enhance the value of a milch cow: one that is quiet and contented feeds at her ease, does not break over fences, or injure other cattle, so much as those that are of a turbulent cast. To render them docile, they ought to be gently treated, frequently handled when young, and never hunted with dogs, beat, or frightened. A moderate degree of hardiness, life, and spirits, with a sound constitution, are desirable qualities in a dairy stock, and all these are found in the Ayrshire. Some have mentioned it as a valuable quality when a cow subsists on a small portion of food; but that will depend upon the quantity of milk which one so fed will yield. If any cow gives much milk on little food, it is one of the best qualities she can possess; but of this I entertain doubts, which forty years' experience, inquiry, and observation, have served to corroborate and confirm. I have heard it asserted that some cows will yield as much milk, and fatten as fast, when fed on coarse, as others will on rich food, but I never met with, nor do I ever expect to see, such cows. The old adage, so common in Ayrshire, that 'a cow gives her milk by the mou',' has always held good, so far as I could perceive. It is of the greatest importance for dairy cows to be fed, from their earliest days, on food that has a tendency to produce the milky secretion, and even to be fed on that description of food when not giving milk. It was common in former times to rear young cows for the dairy on moors and heathy ground, and only to lay them on better pastures and dairy food when they came into milk; but this has been found to be an improper mode of rearing a dairy stock, and they now fare much better in their youth than they did in former times. When young

cows of the dairy breed are reared on moors or bad pasture, and get only as much fodder as keeps them alive, they grow up what in Ayrshire is termed '*a rough beast*,' with large horns, coarse hair, thick skin, high bones, and other marks of a starveling, and they *never after become good milkers*. But when they are fed on better pasture and provided with some green food, and good fodder during the winter, they grow up proper dairy cows, having the shapes and good qualities that have been enumerated. In former times, no other attention was paid to the dairy stock during the winter but to keep them alive. They were fed on the worst and coarsest of oat-straw, or ill-preserved bog hay, cut from the marsh meadows and frequently half rotted in drying. The consequences were that the dairy cows went out to grass in May mere ghosts, lean, weak, and meagre, with their milk vessels dried up. Hence the summer was far advanced before the cows either gave much milk, or that which was of good quality. A lean, starved cow never gives so much nor so good milk as one that is in proper habit of body. [How true a description is the above of too many dairies in the State of New York, and how many have yet to learn that no other animals give a better return for kind care and good keeping, winter and summer, than the dairy cow! Attention to the cows winter and summer, as they should be cared for, would add alone to every dairy in the State, where neglect has heretofore prevailed, at least fifty per cent. more butter or cheese than the amount now realized.]

"Some think it is needless to give cows milky food when they are not in milk. I met some years ago with a clergyman attending the funeral of one of his parishioners, mounted on a large, meagre, lean horse, and laboring hard with *staff* and *spur* to keep up with the procession. On a relative of the deceased urging him to accompany the funeral to the grave, he said he meant to have done so, but found his horse could not travel, which was surprising, as he had given him *three measures of grain that morning*. Some person expressed a doubt that the horse had gotten as much every day. The clergyman said he had no grain since the last time he rode, *about three weeks before*.

"Too many farmers treat their dairy cows on the same principle as this worthy divine did his horse; give them no milky food when *yell*.* But those who do so will find their cows as incapable of giving good milk after they calve, as the clergyman's horse was to travel, even when he had got *three measures of grain that morning*.

"Even young cows intended for the dairy ought to be fed from the time they are calves on food suitable for milch cows, and treated nearly as their dams. Such food and treatment have the greatest tendency to form the milk vessels of the young cows, and rear them with dairy qualities; and when they come into milk after being so formed, they will produce the most copious secretion of the milky fluid. It is by such treatment that a calf is formed into a dairy cow, and those who wish to rear and keep a dairy breed in any thing like perfection, must provide them with an abundance of such food as is suited to the production of milk; and they must supply them with such food at all periods of their existence; when they are young, when they are full grown, when they are in milk, and when they are *yell*."

The suggestions of Mr. Aiton as to the management of dairy cows are worthy of attention, showing, as they do, that a first-rate uniform dairy

* This term is used in Scotland for cows that are not in milk.

stock may be secured, if care and attention is given to the selection of animals from which to breed. Bakewell obtained an improved breed of cattle and of sheep, entirely superior to either of those from which he bred, by pursuing a systematic course. In what manner has the short-horn breed of cattle been brought to their present state of perfection, especially as regards their early maturity for beef? The attention which has been given in the selection of animals from which to breed, possessed of the desired qualities, has brought about the result sought for in this breed; and while like care is continued the same qualities will be perpetuated.

Mr. Colman, in his Tour, says: "The great law that like produces like, though it is not invariable, is comparatively of universal operation. Good qualities are propagated by the union of animals possessing good qualities; and defects, and faults, and infirmities, are in like manner extended and aggravated." The perfecting a breed of dairy cows in this country, we are aware, must be the work of time, and requiring much judgment and skill; but that is no sufficient reason why it should not be done. The end to be secured is one of sufficient importance to justify no inconsiderable outlay, and no small amount of time and labor. Until this is done, the yield of our dairies will continue far less than it should be, and consequently a diminution in profit, much more than is desirable for a farmer to sustain.

Mr. Moses Eames, president of the Jefferson Co. Agricultural Society, in speaking on this subject, the improvement of dairy cows, says: "We should deem it an easy matter to add twenty-five per cent. to the dairies of this county, clear of all expenditure of time and money, by improving the qualities of the cows. It is believed there is no dairy in the county consisting of ten cows or more, which does not show a difference of one-third in the yield of milk from the best to the poorest cow in the yard, yet the same amount of food is consumed by the poorest as by the best." (Report Jeff. Co.)

Mr. A. L. Fish, of Herkimer Co., a dairyman of much experience and observation, says: "A low estimate made from the census taken in 1845, gave the value of the milk product of this State at that time to be forty millions of dollars. The census to be taken in 1850 will doubtless show an increase to fifty millions. If suitable care was taken with the feeding and housing of milch cows throughout the State, it would no doubt increase the amount ten per cent; and much more might soon be added, if proper attention was given to the heifers designed for milkers. I am fully convinced that a proper adaptation of food, with thorough and continued milking, would much improve the milking habits of the cow. It cannot be doubted; I think, that a judicious course in the selection of heifers, and feeding and training them as milkers, will do much towards establishing milking habits, and the object is well worthy the attention of breeders, and a liberal premium for the most successful experiment in this direction, would be worthy of the Society, and would, I should hope, lead to the successful accomplishment of the object."

There is another subject connected with the dairy interest, to which it seems desirable to direct the attention of those engaged in this branch of husbandry. It is well understood by all good farmers, that continued cultivation and cropping of land will soon diminish its fertilizing qualities, rendering necessary a judicious application of manures to restore the exhaustion caused by the crops grown. It has appeared to us that probably our grazing lands, which are solely devoted to that object, will ere

long begin to give indications of a failure to supply that kind of nutriment which is best adapted to the healthfulness of the cow, and to the secretions calculated to furnish the requisite quality of milk. The phosphates, so important and necessary for the milch cow, and which are carried off so largely from the pastures, in the milk, will need to be returned. This has been the case in Cheshire, in England, which has been a dairy region from the earliest period of English history, and bones and bone-dust have been long used there as indispensably necessary to restore the waste made by the animals fed upon the pastures. The following extract from an article in the Edinburgh Review, in relation to Cheshire, shows more particularly the result:

"Dairy husbandry has long prevailed in Cheshire. Now it has been ascertained that every milch cow robs the land annually of as much phosphate of lime as is present in eighty-two pounds of bone-dust. From being thus gradually despoiled of this valuable mineral, the Cheshire pastures have become less rich in nutritious herbage; and hence the peculiar benefit derived from boning them, a practice now so extensively and profitably introduced."

Dickson, in his work on agriculture, published fifty years since, remarks, "that the manuring of pasture lands is much less in practice than ought to be the case, as where the soil is not good, and is kept in a constant state of feeding and pasturage, it would seem probable that the fertility must in some measure decline, if proper means be not taken to preserve and keep it up, even though they should be fed down with sheep, which is unquestionably in this view the most favorable sort of stock. It is indeed hardly to be supposed that the small proportion of excrementitious matter that is dropped at random during the feeding of the animals, especially the larger kinds, under an exposure to the dissipating and wasting effects of the atmosphere at different seasons, where no other sort of food than that of the natural grasses of the pastures is consumed, can in such sorts of land be adequate to the restoration of the great degree of fertility that is constantly conveyed away in the time of pasturing. In the better kinds of pasture lands where the produce of the grass is considerable, improvement may, and undoubtedly does, take place, by feeding them, especially by sheep, as the discharges of the animals are not only more abundant, but a proportion of old grass is left to decay during the winter season, and in that way makes an annual addition to their fertility. It appears probable to us, however it may differ from opinions that have been held on this subject by some cultivators, from much close attention to the management of grass lands of the less rich kinds, in state of pasture, that in such cases, unless attention be paid to improve their condition by some other means than merely that of the manure dispersed over the land by the animals in simply consuming the herbage, they must in time become gradually deteriorated and the quantity of pasture be lessened so as to support smaller proportions of stock than was formerly the case. This supposition seems, indeed, in some degree supported by the condition of the downs, and other uninclosed lands that have been in a state of pasturage for a great length of time; as in these cases if feeding had rendered them more fertile, they must long since have been enabled to carry a vastly increased proportion of stock, which is certainly not the case. That feeding down lands in a judicious manner has the effect of rendering the herbage more fine, and better for the support of stock in general, there cannot be the slightest doubt; but it does not certainly follow that the fertility of land in such cases as has been just mentioned, is thereby really improved, as has been supposed by some employed in grazing. It seems not improbable but that the bettering of the condition of the herbage by feeding the lands with sheep, may have occasionally led to the supposition that the fertility of the grounds was thereby, in *all* cases, really improved. Though immediate improvement of the fertility of pasture grounds may be effected in different ways: as either by the direct application of manure in its natural state, (such as that of rotten dung, lime, marl, or in that of earthy compost,) occasionally over their surfaces in a thin, even manner; or indirectly by the folding or confining of sheep upon the land during the time they consume other sorts of green food. The latter mode is unquestionably the most advantageous and convenient, as it is in but very few situations that the former can be practiced without injury to the arable or hay lands. By proper attention in this way, the more poor pasture grounds might soon, and at little expense, be brought into a good state of pasturage."

Prof. Johnston, in the 2d edition of his lectures, page 1067, in relation to the manure from the droppings of the milch cow, says:—The *milk cow* exhausts still farther the food it eats. In the lean milk cow which has little muscle or fat to waste away, and therefore little to repair, the sustaining food is reduced to the smallest possible quantity. This small portion of food is all that is returned to the husbandman in her dung. The phosphates, salt, and gluten, and even the starch of the remainder of the food she eats, are transformed in her system, and appear again in the form of milk. The dung of the milk cow must be very much poorer and less valuable, compared with the food she eats, than any kind of stock."

"It is true that the bulk of her dung may not be very much less than that of a full grown animal which is yielding no milk: but this bulk is made up chiefly of the indigestible, woody fibre, and other comparatively useless substances which her bulky food contains. The ingredients of the milk have been separated from these other substances as the food passed through her body, and hence, though bulky, the dung of the milk cow is colder and less to be esteemed than that of the dry cow or of the full grown ox."

It will be obvious from the above remarks, that the droppings of the cow, inferior in quality as a manure, cannot for a great length of time answer the purpose of keeping the land in the proper condition, and that a resort eventually must be made to other manures to restore the substances exhausted. Natural pastures have peculiar grasses, which give a succession of rich and succulent herbage during the season. In case of artificial pastures, this seldom or never occurs. Sir George Sinclair states, "that the different grasses of the richest natural pastures in England are 26 in number," and "that from the spring to the end of autumn, there is not a month that does not constitute the particular season of luxuriance in one or more of these grasses." Whether the varieties of grasses in our natural pasture lands are as numerous as in England, we are not informed: but we have often heard from dairymen that no pasturage gives as sweet butter as the natural pastures, and so far as we have experience, we believe this is true. If this is so, then the importance of so managing the lands as to keep up these pastures, and prevent the necessity of a course of grain crops to restore fertility, must be obvious. Professor Johnston, in his lectures, says, "Dairy husbandry produces a special exhaustion of the soil;

and knowing this and what substances have been taken out of the soil and carried off in the shape of milk, we know what to put in to reclaim it."

We desire to call the attention of dairymen to this matter, and trust that they will communicate the results of their own experience and observation, and give such suggestions as may be important in relation to the subject.

Butter Dairies.—There were submitted for premiums two applications—one from Horace Clapp, of Houseville, Lewis Co., the other from John Holbert, Chemung Co.

Mr. Holbert's dairy is well known, the first premium of the society having been heretofore awarded to it, and its high character is still maintained. The management of his dairy is fully described in Transactions, 1848, page 269. During the past season he has had 38 cows: has made 5.403 lbs. of butter, averaging 142 lbs. per cow. Sold pork, fattened on buttermilk and corn, 4.142 lbs.; reserved for family use 1.200 lbs. Butter sold in New York for 22 cents per lb. The season in Chemung has been unusually dry, and Mr. Holbert's pastures have been seriously affected by the drought.

Statement of Horace Clapp.—Farm located in Turin, Lewis Co. Three-fourths of it upland. Latitude 43½°. Farm contains 200 acres under cultivation, 125 acres in pasture, 50 acres in meadow. Soil, loam. White clover for pasture, timothy for hay. My meadows are top-dressed in the fall, with muck, (or common earth,) mixed with manure in equal parts, thirty loads to the acre. Average of hay from 1½ to 2 tons per acre. Commence making butter 15th April, close 15th December. Average quantity of milk per cow during the season, 12 lbs. per day, from the whole herd, 480 lbs.: 5½ lbs. of butter to 100 lbs. of milk. Quantity of milk during the season from the whole herd, 115.200 lbs. Average quantity of butter per cow for the last ten years, from 165 to 180 lbs.: quantity made last season, 6.800 lbs. Rear no calves: generally keep swine, one to four cows. No feed (usually) except grass and hay.

Treatment of Milk and Cream.—Milk strained into pans, stands from 30 to 48 hours, (as the weather may require.) Cream put into a tin cooler, made expressly for the purpose: kept cool and sweet with ice. Churn every day.

Mode of Churning.—Use two churns, each containing 90 gallons: part of the season I churn a good share of the milk by water power; the churn used for cream is one of my own invention, has a tin inside, with a space of four inches between the tin and the wood, to receive water and ice while churning. Temperature 50°. Churn from 50 to 100 lbs.

Mode of making Butter.—It is taken from the churn with a ladle and put into a wooden machine or brake to extract the milk from the butter *without washing*, salted and placed on ice for twelve hours, then worked the second time, and packed in a tub. Use a refrigerator to keep the ice and butter before packing in the tub, and to keep the butter *clean.* (Great care should be taken that the butter is not overworked, so as to injure the grain.) Use Bonaire ground salt, 5 to 6 lbs. to the 100 lbs. of butter. No other substances used. The butter from the dairy has been sold in Boston for the last ten years at 23 cents per lb. Milk room 30 by 24, in basement three sides under ground, with free circulation of air. Milk set upon stone.

No. of cows, 40; breed from ⅛ to ¼ Durham cross with native. Cows calve from 1st to 15th April. The difference in the milk of different cows in the extreme is ½, average ¼ between those giving the best milk and those

inferior. White clover pasture produces the most and best milk. Cows fed in one pasture, which is deemed preferable to change of pasture, with a full supply of running water, and free access to salt, kept in a close trough at all times. It requires from 3½ to 4 acres of land to keep a cow *in good condition* through the year.

Remarks.—The principal cause of poor butter is attributed to the following errors, viz.: 1st. For want of a proper place, cool and airy, to keep the milk. 2d. Want of neatness throughout the entire dairy. 3d. Want of strict attention. 4th. Suffering milk to stand too long before it is skimmed. 5th. Cream not kept sufficiently cool, and standing too long before it is churned, consequently the butter soft, sour, and worthless, and unfit for use by any who like good butter. HORACE CLAPP.

Affirmed before me, by Horace Clapp, that the facts set forth in the foregoing statements are true to the best of his knowledge.

NATHAN NICHOLS, *Justice of the Peace.*

The committee award the first premium of a silver pitcher of the value of $50 to Horace Clapp, Houseville, Lewis Co. The second, a silver cup of the value of $30 to John Holbert, Chemung, Chemung Co.

CULTIVATION OF PEPPERMINT.

ALLOWAY, WAYNE CO., N. Y., *November 28th*, 1849.

DEAR SIR:—I have the honor to acknowledge the receipt of your letter of August 16th, 1849, soliciting information in relation to the cultivation of peppermint as an agricultural product. Minute and careful inquiries of the most important growers of mint in this vicinity, in reference to its culture, extraction of its oil, cost of production, market, &c., have been attended with answers so uniform that I deem the abstract of information on this subject, which I have the pleasure of presenting you, authentic and reliable.

As an agricultural production, the culture of peppermint in the United States is limited to few localities; this county and the adjoining ones, Seneca and Ontario, comprise the largest bed. In the year 1846 about 40,000 lbs. of oil were produced. In Lewis county, in this State, it is grown, though to a less extent; the amount of oil produced there in 1846 was estimated at 4500 lbs. In Michigan about 10,000 lbs. are annually produced; Ohio furnishes about 3000 and Indiana 700 lbs. per annum. The entire crop in the United States, in the year 1846, is estimated in round numbers at 58,000 lbs.

The above comprises all the localities of any importance in the United States, and the above estimates of the annual product of oil were made from correct data for the year 1846, since which time the cultivation of mint has rapidly decreased in consequence of a speculative movement by a New York company, who in the spring of 1847 purchased nearly all the mint then growing in this State, and stipulated with the growers not to raise it for two years thereafter, which condition was generally observed on the part of the growers. The present year (1849) on account of the drought, has not realized the expectations of those engaged in its culture, although the amount

of oil produced is much larger than the product of the two preceding years. In this mint district, 8000 lbs. have been raised; Lewis county furnishes 1000 lbs.; Michigan, 8000 lbs.; Ohio, 1000 lbs., and Indiana 500 lbs. So that the entire crop of 1849 will not materially vary from 18,500 lbs.

I have consulted several of the principal dealers in mint oil, where opportunities have been ample to form a tolerably correct estimate of the amount of oil annually consumed, and their opinion fixes the total consumption, for the various purposes for which it is used in the United States and in Europe, at from 20 to 30,000 lbs. annually.

The price of mint oil is extremely fluctuating. Like other unstaple commodities, the value of which depends upon their scarcity or abundance, it never has assumed a constant and standing value, but its price has generally been deranged by speculation and monopoly. It has happened that the amount of oil produced was for several years greater than the annual consumption, producing an accumulation in the market, and reducing the price to the very low rate of \$0.75 per lb.; on the other hand, when the article was scarce it readily sold for \$5.25 per lb. The average price for fifteen years has been about \$2.50 per lb. This year it readily sells for \$1.50.

Peppermint began to be cultivated in this vicinity as an agricultural product about the year 1816, but for several years the want of a proper knowledge of its culture, and the expense and difficulty of extracting the oil, prevented its extension beyond a few growers, who, however, realized fortunes out of the enterprise. Almost any kind of soil that will successfully rear wheat and maize, is adapted to the growth of mint. Rich alluvions, however, seem to be most natural, as would be inferred from the fact that the wild herb is almost uniformly found growing upon the tertiary formations, on the margins of streams. The rich bottom lands along our rivers, and the boundless prairies of the West are eminently adapted to its successful culture. It is believed by those best acquainted with the subject, that its cultivation must be ultimately confined to the western prairies, where it will grow spontaneously, and where the absence of noxious weeds and grasses, incident to all older settled lands, renders the expense of cultivation comparatively light, and where the low price of land will be an important item in the amount of capital employed, the expense of marketing being slight in comparison to that of the more bulky products of agricultural industry.

The method of cultivation is nearly uniform. The mode of propagation is by transplanting the roots, which may be done in Autumn or Spring, though generally the latter, and as the herb is perennial, it does not require replanting till the fourth year. To ensure a good crop and obviate the necessity of extra attendance the first season, the ground intended for planting should be fallowed the preceding summer, though this is not necessary if the land is ordinarily clean. The ground should be prepared as for maize, as soon as possible in the spring, furrowed and roots planted in drills, twenty inches apart, and covered with loose earth, two inches deep, the planter walking upon the drill and treading it firmly. The proper time to procure roots is when the herb is a year old, when from six to eight square rods of ordinary mint will yield a sufficient quantity of roots to plant an acre, and the crop from which the roots are taken will not be deteriorated, but rather benefited by their extraction. As soon as the herb makes its appearance it requires a light dressing with the hoe, care being taken not to disturb the young shoots, many of which have scarcely made their appearance above the ground. In the course of a week or two the crop

requires a more thorough dressing, and at this stage of growth the cultivator may be used with advantage, followed by the hoe, carefully eradicating weeds and grass from the drills, and giving the herb a light dressing of earth. Another dressing a week or two later is all the crop requires.

The two following years no labor is bestowed upon the crop, though it is sometimes benefited by ploughing over the whole surface, very shallow, in the autumn of the second year, and harrowing lightly the following spring, which frequently renews the vigor of the plant and increases the product.

The mint should be cut as soon as it is in full bloom, and the lower leaves become sere; the first crop will not be fit to cut as early as the two succeeding ones. It is then to be hayed and put in cock, and is then ready for distillation.

I have consulted many mint-growers, who have cultivated it for a series of years, in regard to the average yield per acre, and have arrived at the following estimate, which I think is low, provided the land is suitable, and is properly cultivated. I estimate the average yield per acre for the first year at 18 lbs.; the second year at 14 lbs.; and the third year at 8 lbs.—making the product for 3 years 40 lbs., which I think will not materially vary from the actual result, though growers aver they have raised from 30 to 40 lbs. per acre the first season.

Several years since, the only method of extracting the oil then known was by distilling the herb in a copper kettle, or boiler, and condensing in the usual manner; a slow and tedious process, by which about 12 or 15 lbs. of oil could be separated in a day. But recently steam, that powerful agent, which has wrought such immense changes in our social and national economy, has been applied to this subject with its usual attendant success. The present method consists in the use of a common steam-boiler, of the capacity of from 100 to 150 gallons, from which the steam is conveyed by conductors into large wooden air-tight tubs, of 200 gallons capacity, containing the dried herb; from which it is conveyed, charged with the volatile principle of the plant, into a water-vat, containing the condenser. The water collected at the extremity of the condenser, although it does not readily commingle with the oil, is highly tinctured with it, and is used to feed the boiler. Two tubs are necessary, in order that when the "charge" is being worked off in one, the other can be refilled. The oil is then to be filtered, and is ready for market. The expense of a distillery is estimated at \$150, which, with the labor of two men, and a cord of dry wood, will run 40 lbs. of oil per day. The usual price for distilling is twenty-five cents per pound.

The cost of production is of course greatly modified by circumstances. If grown on rich bottom lands, or prairie, unusually free from weeds and grass, the labor required will be comparatively trifling. From information derived from the principal mint-growers in this vicinity, I have prepared the following estimate of the cost of production of an acre of mint for three years:—

First Year.

Rent of an acre of land one year	\$8.00
1 day plough and drag, 1 hand and team	2.00
½ " furrowing, digging roots, one hand and horse	1.00
3 days planting, at 75 cts.	2.25
2 " dressing with hoe, at 75 cts.	1.50
2 " with cultivator and hoe, 1.00	2.00

2 days with cultivator and hoe (3d dressing)	1.50
1½ " cutting new mint, at 75 cts.	1.13
Curing and drawing to distillery	1.50
Distilling 18 lbs. oil, at 25 cts.	4.50
Can for oil	25
	$25.63

Second Year.

Rent of an acre of land one year	$8.00
Cutting one acre of old mint	75
Curing and hauling to distillery	1.50
Distilling 14 lbs. oil, at 25 cts.	3.50
Can for oil	25
	$14.00

Third Year.

Rent of an acre of land one year	$8.00
Cutting, curing, &c.	2.25
Distilling 8 lbs. of oil, at 25 cts. and can	2.25
	$12.50

Total expenses for three years	$52.13
Forty pounds of oil, at $1.37½ per lb.	$55.00
Deduct expenses	$52.13
Net profit	$2.87

In the above estimate I have omitted the expense of roots, for the reason that the crop will yield as many as are required for planting. The price of roots is about 50 cents per square rod, and if they are in demand, the profit of the crop will be greatly enhanced by selling them at that, or even a lower price.

It will be readily perceived that the culture of peppermint promises no great return of profit in sections of country where land is valuable, and where the expense of production is nearly double what it is in newly-settled districts. It is a fact that in Michigan, and other Western States, the actual expense of production is about one-half less than the above estimate, and the yield is a fourth greater; the greater distance from market, which is usually New York city, not being taken into account, the freight on oil being comparatively trifling. Another consideration in favor of prairie cultivation is, that the mint will endure for years by simply ploughing over the surface every second year, which seems to invigorate the herb, and obviates the necessity of replanting every second or third year, as must be done in older settled localities.

I have already pursued this subject to a greater length than I intended, but if my efforts to arrive at a correct statement of the subject under consideration shall be the means of imparting any interesting or useful information, my object will be attained.

Yours respectfully,

DE WITT C. VAN SLYCK.

DE WITT C. LAWRENCE, Esq.,

Washington, D. C.

PARASITIC FUNGI.

A Lecture, delivered in the City of Norwich, England, at the Annual Meeting of the Royal Agricultural Society, July 18, 1849,

BY REV. EDWARD SIDNEY, A. M.

Gentlemen:—I have no common satisfaction in addressing you in a county where for many years my humble efforts, made long before similar exertions had become at all general, were so favorably received and kindly acknowledged by all classes of persons. I will not, however, indulge myself by any further preface, but proceed at once to the task I have cheerfully undertaken. I shall endeavor to describe in simple, popular language, the nature, habits, and, as far as I can, the preventives or palliatives of the principal *parasitic fungi* of the British farm, beyond which, of course, I cannot go; avoiding all needless technicalities, and stamping my explanations with those characters which will promote their currency with every hearer. Whenever I am obliged to use a scientific term, I shall try to explain it; and I commence by remarking that the epithet *parasitic*, applied to a plant, means that it lives at the cost of that on which it grows. A *fungus* is a cellular plant without flowers, living on air and nourished through a *stalk, stem*, or *spawn*, called its *mycelium*. It is propagated by minute seeds, or spores, or sporules, either colorless or not, but never green, and occasionally inclosed in skinny coverings, termed *sporidia*, or spore cases. Fungi live by imbibing juices impregnated with the peculiar principles of the matrix on which they grow. The spores mostly germinate either by a protrusion of the inner membrane, or by a lengthening of the outer covering; and the spawn is the development of these spores, or of itself already produced, possessing the power of imbibing the juices just alluded to. The most familiar example is common mushroom spawn, which the little seeds will sometimes throw out on strips of glass, so as to be well observed. *Fungals* most commonly grow upon animal or vegetable substances in a state of decomposition; but many of the simplest organization attack tissues, in which its commencement is at least not ascertainable, or, if commencing, hasten it beyond recovery. The simplest form of a fungus is common mouldiness, which has two types. The first, as may be seen by the aid of the microscope, is composed of jointed threads made up of simple cells, placed end to end, which separate and seem capable of reproduction. This is represented in Plate 5, fig. 1, where the little cells may be seen placed as described. These cells are capable of being separated, and appear to be reproductive. The second assumes a thread-like appearance, bearing spores upon the tips of the threads, or on short processes, and sometimes in cases, by the rupture of which they are dispersed. They sometimes assume the beautiful appearance delineated in Plate 5, fig. 2, where the jointed threads and the attachment of the spores in the way mentioned will be perceived. The actual forms even of these simplest fungals are thus shown to be extremely interesting. Examples of spores in cases will be pointed out as we proceed. In a higher state, fungi take a determinate figure, formed of a mass of cellular tissue, the centre of which is all spores, attached to it often

in fours. This at length dries up, leaving only the dusty spores, as in the case of a common puff-ball. The most completely formed fungi have two distinct surfaces, one of which is even and without any opening,—the other separated into plates, called the *hymenium*, or *gills*, to which the spores are attached, generally four together, as seen in Plate 2, fig. 3. Upon these differences of structure depend those various attempts at botanical arrangement, which I have no time to describe. So numerous are the seeds, spores, or sporules of fungi, that it is not easy to conceive a place whence they are excluded. Those which grow on matter in which decomposition has decidedly begun, have been well called the "scavengers of nature;" but others of a most minute description, some of which belong to my subject, apparently attack tissues in full health and vigor.

With regard to the properties of fungi, I can only mention in a word that they are respectively *eatable*, *poisonous*, *medicinal*, *intoxicating*, and even *luminous*, lighting up with their living lustre mines and caverns where they grow, and in some places assuming at night the appearance of pendulous lamps hanging from the trees on which they vegetate.

I. I now propose first to describe the chief of those minute parasitic fungi which injure the corn and grasses of this country, premising that corn plants are themselves only grasses, the seeds of which are sufficiently large for our food. These little pests generally present themselves to the unassisted eye under the form of masses of dust, differently colored, and appear on all parts of the plants except the roots. (1.) The stems or straw of our corn plants, and also the leaves, are frequently disfigured by a dark series of patches, constituting true mildew, and called by botanists *puccinia*, from the Greek πυκα, *thickly*, because of the dense masses of which it consists. It is found upon reed as well as corn, but the microscope reveals a slight difference in the structure of the spores, by which the puccinia of one species of plant is distinguishable from that of another. It was imperfectly noticed by Felice Fontana in 1797, but in 1804 was investigated more closely under the auspices of Sir Joseph Banks, on account of its ravages that season, and microscopical drawings, still in the British Museum, were executed by Mr. Bauer. Its common appearance is seen in Plate 5, fig. 4, which represents it on the straw a little magnified. Its appearance under a first-rate modern microscope is shown in Plate 5, fig. 5, where you perceive that these dusty patches are crowds of club-shaped fungi (spores), the thicker end of each of which is divided into two chambers containing the reproductive sporules. They burst through the *epidermis*, or upper skin, which they lift up, and the sporules, dispersed through the air, have been thought to find entrance through the *stomata* or pores. The ground of this notion is, that the patches of mildew are first seen in small cavities immediately beneath these *pores*, which, as Professor Henslow, to whom I am indebted for the specimens now before you, observes, certainly looks very much as if the sporules entered there. With his usual caution, he remarks, that "the fact stands in need of proof, and that hitherto the evidence is more in favor of similar fungi being imbibed by the roots of the plants which they attack." We shall shortly see that some experiments on another fungal parasite of wheat tend to show that these fungi are developed in a manner little suspected even by the most accurate observers. This parasite robs the living plants of their juices, and must not be confounded with a very minute fungus, called *dipazea*, which is peculiar to the joints of the straw; nor, as is more common, with another black fungus, which gives a

dingy aspect to whole fields towards harvest, and is often called mildew, but which never attacks a plant till it is previously diseased, and which, for want of any other name, I am obliged to announce by its botanical one, *Cladosporium herbarum*, the character of its growth being, as you see in Plate 6, fig. 6, totally unlike mildew. It grows on old leather as well as on wheat. The dissimilarity to *puccinia* is visible enough. Spores may be seen here in their cases. The common appearance of the straw, as shown in Plate 6, fig. 7, not being accurately observed, misleads. Though I have no other name but the botanical one by which to call it, I can trace its derivation to the Greek κλαδος, a branch, because the spores grow on minute branches. Whatever tends to preserve the health of the wheat will prevent also the attacks of this fungus.

(2.) We now come to other minute parasitic fungi of corn-plants. They are called *uredines*, the plural of *uredo*, from the Latin *uro*, to burn, on account of the scorched appearance of the parts on which they vegetate. Different parts are attacked by different species: the *uredo* of the maize alone growing everywhere except on the roots. The first *uredo* I shall mention is known familiarly to the farmer as rust, red-rag, red-robin, red-gum, and comes out in yellow or orange blotches on the stem, the leaf, and the chaff-scales, appearing as a powder. The hue of a whole field is often affected by it, and fears naturally arise; but it frequently happens that a few days' bright sunshine dissipates the fungus; but mischief has been done, and the crop feels it. It is called *uredo rubigo*, and under the microscope the spores appear as in the drawing (Pl. 6, fig. 8). You may observe the spores in the highly magnified diagram, most accurately drawn from the microscope by Mr. Leonard. They are seen growing on the *mycelium*, which finds its matrix in the tissues of the plant. There is a curious botanical question, whether this *uredo* passes to *puccinia*. I think the best evidence confirms the opinion that such is the case.

(3.) The sooty powder on the flowering parts of corn-plants, called smut, chimney-sweepers, and dust-brand, is formed of the spores of another *uredo*, called *uredo segetum*. It renders the whole interior abortive; the pedicle of the flower swells, and a black dust occupies the whole. These spores are so diminutive that the diameter of one is only $\frac{1}{2500}$ inch. Strange to say, some farmers welcome its appearance, because they conceive it augurs a good crop, forgetting that whatever ear it attacks, it makes one less in that crop.

(4.) Another *uredo* called bunt, or pepper-brand, seizes on the grain of wheat, and that to a great extent, if not guarded against. This *uredo* is termed *uredo fetida*, on account of its filthy odor. If you break a grain infected, you will find the flour replaced by a black mass, oily and fetid, and all the ovary is seen to be destroyed, except the integument, which swells, and incloses the spores, amounting in a single grain to nearly four millions. They are, like those of *uredo rubigo*, shown in Pl. 6, fig. 9, on their mycelium, or spawn, and are in diameter about $\frac{1}{800}$ inch. This drawing, also from the pencil of Mr. Leonard, shows the spores perfectly, as they would appear under an achromatic of $\frac{1}{16}$ inch focal length, with an eye-piece of moderate power. This *uredo* confines its attacks chiefly to the seed of wheat among our cereals; but some other plants, as the convolvulus, and of the grasses, rye-grass, bromus, and poa, are subject to have their seeds destroyed in a similar manner.

(5.) These *uredines*, as well as mildew, though till recently not understood, have long been the subjects of observation. Moses threatened the

disobedient Israelites with mildew, and the Romans had their false god *Robigo*, whom they thought to propitiate for the preservation of their fields from the disastrous attack of these diseases. A feast called *Robigalia*, to this deity, was always kept on the 25th of April, to deprecate blasting and mildew. The diseases themselves were long matters of curious speculation, and they were till lately regarded as accidents of vegetation, resulting in a mass of injured cells from the dampness of the soil, excess of manure, or fogs, or punctures of insects, and have even been attributed to the presence of the barberry, a fungus of which, called *œcidium*, is shown in Pl. 6, fig. 10. On the left is seen a piece of the leaf of the barberry, with the spots of *œcidium* upon it. On the right, one of these receptacles, containing spores, is magnified, to show the form of this fungus. The *mycelium* on which it grows is also visible. There have been many botanists who have believed that the spores of *œcidium* come up as uredines when they fix upon any cereal. It is the microscope which has enabled us to recognise in all these parasites a true fungal character, and to trace their growth; but the damage accruing from them has not been adequately estimated, for they never appear in the farm or garden without injury to the produce. For example, few can have failed to notice the effects of *uredo* on the rose trees, and also, but less frequently, on geraniums.

(6.) Numerous have been the speculations, and often ingenious the experiments on the way in which the reproductive sporules find entrance into corn-plants. Various remedies have been tried, and some with success, as in the case of bunt, or pepper-brand, which may be effectually checked by good dressing of the seed. The principle of dressing is the conversion of the adhesive oily matter of the spores into that which is soapy, which is easily washed off. This requires an alkali, and suggests the use of lye of potash, soda, or wood-ashes. Liming also has a good effect. Sulphate of copper and arsenious acid, the arsenic of the shops, are often used; but, besides the other objections to them, there is the danger to the vegetative powers of the seed. It is not usual to dress for smut, which attacks not only wheat, but barley and oats; yet the same reason applies in these cases, except that more difficulties are in the way, because of the dissipation of the sporules before harvest, and the remainder being knocked out in threshing. It is important to ascertain with certainty how the contents of the spores grow. Those of bunt are too large to enter the *stomata*, yet if sown with wheat it reappears. Some think the mycelium divides the earth into molecules, each of which has a vegetative power, and that any one absorbed by the roots extends until it reaches its peculiar point of election in the system. Others conceive that the spongioles of the roots imbibe the fine contents of the spores, which grow. It is certain that due dressings and washings prevent the reappearance of bunt, and that excess of manure encourages red-robin and mildew, which have also been observed to follow long feeding with sheep. Among the antidotes to mildew, I venture to name clean farming, amendment of the texture of the soil, ventilation, and letting in light; checking over-luxuriance in the young plants, growing early varieties in places subject to it, and avoiding putting on manure directly before wheat, and hoeing the wheat when young.

(7.) There seems no reason to believe that any *uredo* mentioned is deleterious, though bunt is disagreeable in the flour. It has been said that in past times, there were gingerbread bakers who had no objection to flour which contained the black matter of bunt, as it saved them the brown sugar

which they otherwise must have used, to render this confection sufficiently dark colored for the approbation of their customers. If such customers there ever were, they must have had more regard to appearance than to quality. But I am now about to describe a fungus closely allied to *uredo*, which attacks grasses for hay, that appears to be quite poisonous. It is termed *ustilago*, having a similar derivation with *uredo*, and is left by Corda in his general classification in the same group. Tulasne wrote a long paper on *ustilago* in 1847, with drawings. The one in question is called *hypodytes*. Its spores are black, round, and very small, and I shall call it *grass-smut*. There was a great deal of it in 1848. In a field near King's Cliffe, almost every flower-stem of the *bromus sylvatica*, which was one of the principal grasses, was infected by it. A plant was taken by Mr. Berkeley from this field, and, instead of its throwing up fertile spikes, almost every one is attacked.

The structure in a very young stage is thread-like, but all traces of *mycelium* soon disappear, and nothing remains but a mass of minute spores. (Pl. 7, fig. 11.) The whole was drawn by Mr. Leonard from the specimen this day exhibited to the audience. In addition to the ruin of the grass, this fungus is most pernicious. According to Leveillé, the immense quantity of black dust resulting from it in the hay-fields in France, produces disastrous consequences on the hay-makers, such as violent pains and swelling in the head and face, with a great irritation over the entire system. A like account was given of these peculiar maladies by Michel in 1845, which he compared to the well-known effects of ergot, on which singular abortion of the seeds of corn and grasses I do not enlarge here, because, though accompanied by a fungus called *ergotetia*, it cannot be called one. Botanists term it *ergotetia abortifaciens*, or ergot fungus, *rendering the seed an abortion;* but the only argument they adduce in favor of its producing ergot is, that it constantly attends it. But it is clear that because two things are coincident it does not follow that they are cause and effect, while the best examination does not warrant such an inference in this instance. I will only remark that it is more common than is supposed; and I am persuaded that cattle in ill-drained localities, where it always abounds, derive serious injury from it, and that it is the unsuspected cause of many disorders both in them and human beings.

Another *ustilago* named *typhoides* damages the stems of reeds, swelling and distorting them, and rendering them almost useless for thatching.

The only remedy for such a disease in a grass-field seems to be breaking it up, and substituting for it a crop not subject to its ravages.

I have not time to dwell on another kindred fungus found occasionally on the gramineous tribes. All are more or less subject to some *uredo* peculiar to them.

(8.) I may be expected to allude to the true theory of *fairy rings*, which are due to three species of the most highly organized fungi, called *agarics*. Mushrooms are agarics. Those of the fairy rings throw out their spawn in a circular direction, and the ground being continually exhausted by it, a ring is formed, which is rendered greener than the surrounding grass by the stimulus of the spawn itself.

I may just observe that in some countries, grasses and corn, and particularly barley and rye, are destroyed by a curious mould, which is developed beneath the snow, and if it appears in snow without previous frost, it is often fatal to the whole crop. It has not yet been noticed in Great Britain, but

the matter will be worthy of attention should any long frost occur. I cannot omit to mention here, that the mouldiness in stacked hay is generally the common *aspergill*, to be described presently, and sometimes the common *penicillium*, also coming under review. The spores of these will be seen to be injurious, and therefore such hay ought always to be steamed. The cut surface of hay-stalks is sometimes covered with a light orange or brick-dust red fungus, which is a fusarium, so termed from the spindle shape of the spores, but it is entirely confined to the stems composing the hay.

II. I go on next to the parasitic fungi of leguminous plants, which are particularly subject to them. A small *dipazea* destroys peas in wet seasons, attacking all parts, especially the pods; but the blight which we mostly see on peas, bears the botanical name *erysibe*, or *erysiphe*, the Greek for mildew, and is the same kind of mould that infests peach leaves. In its early stage it is a jointed mould, seemingly superficial, which on examination shows little globules, changing from yellow to black, and springing from a floccose web filled with minute sacs containing the sporules. (See Pl. 7, fig. 12.) These globules and the sacs containing the spores are here depicted; and a good idea may be formed from inspecting the drawing, of the character of this fungus, as exhibited by the microscope. They put out fibres, which lift them up from the surface of the leaf, and are preceded by threads, white, or grayish, consisting of bead-like joints, of which it seems the uppermost fall off and grow.

Beans are injured by a *uredo*, the *uredo of the bean*, which was very prevalent last year.

Vetches are attacked by a fungus styled *botrytis*, from the Greek *βοτρυς*, a bunch of grapes, because the spores grow in this way. (See Pl. 7, fig. 13.) This drawing shows a minute portion highly magnified, and will convey a just idea of its appearance and of the cause of its name. It is called the *botrytis of the vetch*, but in some places it attacks peas and lucerne, and it might therefore bear the name of the *leguminous botrytis*. *Botrytis* is distinguished from other moulds which are articulated, and so named *monilia* or *necklace* moulds, by it not having its threads jointed.

Dutrochet first stated, and I have verified it myself by a series of experiments detailed in my little work on the blights of wheat, that if a single drop of almost any acid is mixed with albumen, in eight or ten days necklace molds appear; but, on the other hand, caustic alkali gives *botrytis*. With fibrine of blood and phosphoric acid, the results are reversed. Every sort of vegetable matter I tried with acid yielded a mould, but when albumen contained a neutral salt none appeared. If salts of mercury are present, the mould is stopped; æthiop's mineral does not check it; oxide of lead hastens it; oxides of copper, nickel, and cobalt retard it; oxides of iron, antimony, and zinc have no effect; all perfumes stop it. Flowers of sulphur effectually check the erysiphe on the peach, but they could not be applied to pea-fields. How far a knowledge of the facts I have just stated may lead to a remedy, easily applied in the shape of manure, future experiments may show.

III. These observations naturally lead to the *botrytis infestans*, found on the leaves of the potato when suffering from the true murrain. The *mycelium* of this fungus traverses the entire cellular tissue of the plant, and emerges from the *stomata* of the leaves, choking them, and the consequence is decay. Pl. 7, fig. 14, shows the microscopic appearance. This fungus is, I believe, new to Europe; so widely distributed a species could not

have been overlooked. This diagram is the same as that given by Mr. Berkeley in his admirable paper on the potato fungus. The mycelium may be observed traversing the cellular tissue of the leaf, and one of the threads of botrytis, that to the left, issuing from the stoma. Mr. Berkeley, the very highest authority, is of opinion; and he writes me word, "I am convinced more and more that the fungus is the real enemy." Certainly, all other theories have failed. The principles of the geographical distribution of food-plants plainly show us that extremely minute and unappreciable differences in climacteric condition may throw plants into an unhealthy state; which conditions might exist unsuspected for a few years. Hereby plants may be brought into a state which renders them capable of being attacked by certain parasitic fungi, of which the potato blight may be an example, and the *botrytis infestans* becomes, as it really seems to be, the proximate cause of the malady. The *botrytis* is found on the tubers; but besides this, a *fusarium*, which must not be confounded with the former, nor regarded as characteristic of the potato disease, but of another, often occurring in the same tuber with it. (See Pl. 7, fig. 15.) This fusarium, highly magnified, is represented in this figure. It will be perceived to be totally different from the *botrytis*, and the spindle-shaped spores tell the origin of its designation. Genuine science alone enables us to make such discriminations; and it is not too much to hope that experiments founded on some such results as I have announced from the few I have had leisure to make, may lead to the discovery of a check to the growth of this pestiferous *botrytis*.

The root crop of the farm suffers much occasionally from fungal diseases. Parsneps are subject to a variety of the *botrytis parasitica*, which blights the leaves. The leaves of turnips are attacked by the same fungus; but a different one, called *fusi-sporium*, is found on the roots, but with no extensive injury.

Mangold-wurzel is affected by the *uredo of beet*, with brown or black spores like that of the bean; but in all these cases the connection between the disease of the leaves and decay of the roots has not been sufficiently observed.

IV. Hops are damaged by an *erysiphe*, having the habits of that of the pea. It seems to be in its early stage a peculiar mould, but this opinion needs fuller confirmation. The whole subject needs investigation, and therefore I do not dwell upon it.

V. I now pass from the parasitic fungi of the fields to those found on other parts of the farm, its buildings, yards, and interior economy. The fungi destroying timber are not sufficiently known, though their effects are so common. Dry-rot is generally attributed to the spawn either of the *merulius lacrymans* or *weeping morel*, so called from the little drops of water it contains, or to that of the *polyporus destructor*, named from its many pores. But any of the fungi found on wood, and they are numerous, are capable of producing it; and among them are, besides the two mentioned, another *morel* called *vastator*, the dædalea of the oak, deriving its appellation from its labyrinthine structure; various *polypori thelephora*, from *θηλη*, a nipple, by reason of its papillose surface, and *sporothricum*, the spores bearing hairy filaments. (See Pl. 4, fig. 16.) The microscopic view of a morsel of sporothricum, (vide fig. 16) is here given very highly magnified. The effects of all these pass by one designation, dry-rot. I will now describe its progress. The first signs are small white points from which a filamentous substance radiates parallel with the surface of the wood. This is

spawn, which, as it gains strength, insinuates itself into any crevices, however minute, and the threads are so fine that they pass between the tubes from which the wood is organized, and forcing them apart destroy all cohesion. (See Pl. 4, fig. 17.) This diagram shows these threads from one of the polypori. Sometimes various spawns interlace and form a tough stratum; and the rapidity and force of increase are such as to cause, under favorable circumstances, the total destruction of the wood. From the experiments previously described on the growth of fungals, you will perceive that the acidulation of the fermenting sap promotes their growth. Kyanizing, or the application of corrosive sublimate, has been resorted to as a preventive. An experiment may be made to show its effects: a solution of fish-glue will be found to yield fungi in abundance, but if corrosive sublimate be mixed with it none will appear, and the same result will follow additions of certain preparations of copper and other mineral poisons. Oak felled in the spring, when full of sap, is almost sure to have dry-rot; therefore that which is destined for farm erections should be cut in winter, for otherwise the only chance of stopping the appearance of the fungi is to substitute some poison by saturation for its proper juices, or to force them out by an objectionable pressure. Immersion in water is beneficial, but heat applied to dry wood only hastens the malady. In Brest dry-rot is said to be unknown, and all the timber used in its yards is kept in a creek of the harbor.

VI. Fungi of a different kind from any yet described follow the British farmer into his dairy, and interfere with his household economy. *Penicillium* and *aspergill* are two terms applied to some of them, because in their microscopic appearance, given in the delineation before you, they resemble sprinkling brushes. (See Pl. 4, figs. 18 and 19.) Fig. 18 represents the penicillium very highly magnified. Aspergill is shown in Pl. 4, fig. 19. They are sufficiently indicative of their names. *Penicillium* is the mould on hay, as was mentioned, and is found on bread, and also in the inside of casks; and there is reason to believe its spores poisonous, for two coopers who entered a great tun, covered with this mould, to clean it, inhaled them, and were seized with violent pains in the head, giddiness, and vomiting, which only yielded to severe medical treatment. A penicillium is the mould of milk, and we have here a magnified representation of its development. (See Pl. 4, fig. 20.) The penicillium may be here noticed developing itself from the mass of the mould. If these moulds appear much in the dairy or on the bread kept in it, the best remedy is washing the walls with chloride of lime, which it is important to know, as milk often suffers greatly in this way. Foreign badly-made cheese has an unpleasant mould in brilliant scarlet patches; but in England the principal one on cheese is an innocent mould called *torula*, from *torus*, a bed, from its coming in layers. I may here just observe that the vinegar plant, as it is called, is in its advanced state a penicillium; and the beer fungus has been called torula; but before we decide the latter, we must see a regular fructification in air. There are hundreds of non-productive spawns for want of air and light, as, for example, the strange forms which diffuse themselves in cellars, which are incomplete developments.

You will permit me to state in this place, that the fungi on stored fruit are a *torula*, a *penicillium*, common fruit *mucor*, and a mould like the first stage of the erysiphe. Harting asserts that he has actually propagated the potato disease from the brown matter in mouldy apples and pears, and it is remarkable that some ingenious experiments of Mr. Berkeley, on the growth of bunt, lead to show that its propagation may arise from mere grumous matter in the spores, which proves that many of our theories are immature. The experiments were thus made:—Wheat seeds were immersed in a mixture of water and the spores of bunt. A curious mould with conjugated spores sprung up on the spores of bunt. The wheat was sown, and the plants came up infected; but no communication could be traced between the cells and the shoots thrown out by the spores; no intrusion of the *mycelium* developed by the spores into the wheat could be discovered. The inference is, that the fine contents of the spores propagate the fungus; but this is quite opposed to our general idea of the growth of fungals.

VII. I will lastly touch on the facts now established relative to the fungi attacking animal tissues, which are very surprising. Sapy meat has always a fungus something analogous to what is called the yeast fungus. This fungus is a mass of molecules, probably an early state of the same that is called vinegar plant, the last stage of which has been stated to be a penicillium. What are called *sclerotia* from σκληρος, hard, appear in animal matter under particular circumstances; but these are only states of other fungi, for even *agarics* have been known to spring from them. The fungus of the West Indian wasp, of the caterpillar of New Zealand, and the muscardine of the silkworm, are all well-known examples of fungi attacking living animals. The last is easily propagated by inoculating healthy caterpillars, which I mention to show that a fungal disease may be conveyed from one animal to another in a state of health. I believe a more accurate knowledge of such facts will be ultimately of great use in investigating certain diseases prevalent among animals of the farm, and hitherto inexplicable. Sclerotia have been found in bad fractures, but they are not parasites: true parasitic animal fungi grow only on the skin or mucous membranes.

M. Robin published in 1847 a most curious account of the vegetable matters growing on living mammalia, which he classes into two divisions—those of the skin, and those of the mucous membranes. The mucous membranes of the digestive canal and of the lungs are subject to their attacks; nor is the stomach free. All herbivorous animals are liable to moulds in the digestive canal, very like the yeast fungus, but larger; yet it is confined to them, and never found in carnivora, birds, or reptiles. A penicillium of birds is tolerably well known; and pheasants, fowls, and pigeons are occasionally the prey of a mould as yet imperfectly described. An *aspergill* is found in eggs; and that found in the air-cells of the lungs of the eider-duck has been often noticed. Parasitic animal fungi yield, it is said, to sulphuric acid; whence a hint may be obtained as to remedy, but I wish to speak with due caution on these novel investigations. Attempts have been made to inoculate dead animals with these fungi; they have entirely failed; the life of the animal is essential to their growth, the conditions of which seem generally to be imperfect states of respiration or nutrition, or irregularity. There seems to be a moment when the powers of assimilation flag, and then the fungi step in and appropriate the nourishment designed for the system. It may be the same with apparently healthy plants. We may here have the first ward to the key to many a hidden secret as to the ailments of the animals of the British farm.

VIII. I have now completed my humble attempt to give a popular outline of the chief parasitic fungi of the farms of England, which only require simpler names to be easily understood; and the farmer must learn to dis-

tinguish them from the diseases of the superficial tissues. It is a subject well suited to farmers' clubs, where good botanists and microscopists might be induced to attend with their instruments, and give simple explanations. Let it be remembered that simplicity is the handmaid of all useful science, whose truths are only impeded by needless grandiloquence. I can say by experience, that endeavors to propagate it will be found good subordinate auxiliaries to the higher aims of men of my own sacred calling; and while we see that there is not a thing so small or so apparently mean, but that it sparkles with some beam of the skill of its great Maker, I conceive that it befits the office I bear to show that the nobler teaching of Divine Wisdom by things revealed does not tend to deface, but to elevate our conception of God's perfection in things created. This earth was not made to be neglected, nor man to be unobservant; and if these unpretending gleanings I have gathered in my few moments of leisure shall this day have proved in the least degree acceptable to the present audience, or generally of any interest to the British farmer, of the kindness of whose disposition I have had more proofs than I have deserved, I shall rejoice in the honor conferred upon me by being allowed the privilege of addressing you.

IMPROVEMENT OF WORN-OUT LANDS BY THE USE OF PEAS AND CLOVER.

(BY H. BURGWYN, ESQ., OF JACKSON, NORTHAMPTON CO., N. C.)

THERE are large bodies of land lying in eastern and middle Virginia and North Carolina, which have been so much reduced by continued cropping, planting tobacco, cotton, and sowing oats, as no longer to pay the cost of cultivation, and are "turned out as waste lands." These really still possess a good share of fertility, and by a very moderate expenditure of labor, and attention to common-sense principles of agriculture, may be reclaimed, and have their productiveness increased from 100 to 150 per cent. They can be made truly valuable, and I do not hesitate to say, as the result of my experience, that they will give a greater profit in the course of five years' cultivation than can be derived from clearing any except our rich river lands.

This is the method I have adopted, and by which I have increased the product of such lands from 1½ to 2 barrels of corn to 4 barrels per acre; and from 4 to 5 bushels of wheat to 10 and 12 bushels per acre. The increase in wheat is proportionably greater than that in corn. My system of culture is substantially as follows: If the "broom-straw," in which these waste lands always grow up, retains any sap by which when turned under fermentation will ensue, and cause the straw to rot, let the land, *as it is*, be ploughed with the largest-sized plough, drawn by three or four horses, running as deeply as possible, say not less than ten inches, and turning every thing under. If the straw has no sap, it will not rot in a year, and in that case burn it off, and plough as before. If possible, follow each plough with a subsoil plough, and go 6 or 8 inches deeper. This will make the stiff clay, which almost everywhere underlies our land, more open to the general influences of the sun and air; and enable it to get rid of the surplus water of winter, and of heavy rains in other periods of the year.

About the middle of June following, when the weeds are about half-grown, and before they have formed their seeds, sow the land broad-cast, at the rate of a bushel per acre, with any of the numerous varieties of peas common among us, except the "black-eyed," which, having very little vine, affords little shade. In all cases I prefer those which have the most vine, and ripen earliest. Then, if the land has much of weeds or grass upon it, turn under the peas with any kind of plough, running not over three inches deep. If the land is bare of weeds, I prefer covering the peas with a large, heavy harrow, running both ways, first lengthwise, and then across the beds. As it is important to give the peas a start over the weeds and grass, I soak them six hours in water and rub them in plaster of Paris; and when they begin to leaf out and branch, say when 12 inches high, I sow plaster at the rate of a bushel per acre. This stimulates their growth, and they overpower the weeds and grass.

When about half the peas are ripe, not "half ripe," hogs should be turned in to trample and cut up the vines, otherwise it is extremely difficult to turn them under. So soon as this can be done, the hogs should be taken off, for the peas are useful in shading the land from the summer's sun, a most important matter in all improvement, and in giving to the soil a large mass of vines, leaves, and other vegetable substances. From experience in the use of both, I think peas but little inferior to clover (to which family it indeed belongs) as a specific manure for wheat.

After this mass of vine has been turned under, you have a "pea-lay," over which sow a bushel and a half of wheat per acre, and six quarts of clover-seed. Harrow both in thoroughly, and let the work be finished by the middle of October. The return will of course depend somewhat on the quality of the "old field," but I venture to affirm that it will amply repay all labor and outlay, and astonish by the great result from apparently so trivial a cause.

I am familiar with the great increase of crops from the use of lime and clover, and I do not mean to compare the two methods for renovating land as equal; but where *lime* is not to be had, there is no application that can compare for a moment on well-drained land (if it need draining) with plaster, peas, and deep tillage. No gold mine is so valuable as a good marl pit. I am, however, confining myself to interior districts, where neither lime nor marl can be had.

After the wheat comes off in the June following, the clover, if sown early in October, will have grown so as to shade the land pretty well, even on the waste lands I speak of. It should not be grazed the first year at all; in the February after, top-dress it with all the manure to be had, not forgetting to apply all the *old ashes* within reach. This season or time in the year is best for applying manure in our country, where the hot sun acts so injuriously on a bare surface. The roots of the young clover being protected from hard frosts and sudden changes by the manure, it shoots forward with the earliest warmth of spring, and smothers all weeds.

When weeds mature their seeds, they draw upon the fertility of land equal to most crops. Clover gives a crop as profitable as any other, and it is all returned to the land in the droppings of the stock while grazing upon it. As proof of its profit, for three years I have never fed my working horses but once a day on grain or fodder, from the middle of May till the clover fails. They are turned on the clover fields after the day's work is

over, and taken up in the morning in good condition for service. I have never lost one by this management; in fact, they improve from the time they are thus treated, and work better.

After the clover has been on the land for two summers, during which period it has dropped three crops of leaves and stalks, and thereby greatly improved the land, either turn it under as before, in September or October for wheat, or later in the fall for corn the ensuing year. In the former case, you will find your land as thickly set as before, with volunteer clover, which ought to remain as a pasture for the summer, after the second crop of wheat comes off. If corn instead of wheat be grown, sow peas broadcast among the corn at the last ploughing, soaking the seed and rolling them in plaster, as before. After the corn crop, do not suffer the land to "lie out." No error can be more opposed to good farming, than that which assumes that land is improved by "lying out," and permitting a crop of weeds to mature upon it. If we had duly reflected, this error would long since have been apparent, in the continued sterility of thousands of acres lying waste around us, *not a whit improved by "lying out."* After the soil has once been brought up by peas, subsoiling, or deep ploughing and clover —all within reach of the farmer even in the interior—it will not again relapse, unless the former barbarous and senseless practice of exhaustion and negligence be again adopted. If lime can be had, even at a cost of 20 cents a bushel, I would in all cases spread it on the land, after the first crop of peas had been turned under, to the amount of 15 or 20 bushels per acre. This quantity will greatly benefit the land, and enable the owners shortly to repeat the application of a like quantity.

CULTIVATION OF THE TEA-PLANT IN THE UNITED STATES.

DEAR SIR:—The frequent notices which have appeared in the public journals, by those who have visited my tea-garden in Greenville, S. C., and by those who have not, seem to render superfluous the addition of another word.

Nothing but your request to make a communication on the subject of tea cultivation, through the Patent Office, would induce me to risk the danger of wearying the public ear and of exposing myself to obloquy.

During the past year the tea-plant under my care has passed through severe trials, from the injury received in transplanting, from the heat generated in the packing-cases, from the want of shelter during the severe frosts of February, from the excessive heat in June, and from the drought of 58 days' continuance in July and August. The plants were divested of their leaves and generally of their branches and twigs in February, during my absence in New York. Knowing that the plants were tender, and not fortified by age and mature growth against severe weather, I had directed them to be covered in case a material change of temperature should occur. But these orders were neglected, and they consequently suffered from that cause.

The plant is sufficiently hardy to resist any weather occurring in this part of the country, when seasoned for one year.

The plant has grown thrifty since April, and the quantity of foliage, buds,

and blossoms, show that the root has taken strong hold, and is now fully equal to produce its fruit next autumn, which always follows the year after the blossoms. I have a variety of both black and green tea-plants. The buds and blossoms of the latter did not appear until a fortnight after the black tea-plant. But the blossoms were larger when they did appear in September, October, November, and December. From present appearances, I think the blossoms of some of the late plants will continue to unfold until spring. It is not an unusual thing for the blossoms and the fruit to appear at the same time upon the same plant. In this particular it differs from any plant I have seen. As my chief object, at present, is to cultivate and increase the tea-nut, it will be a year or two perhaps before I attempt to convert the leaf into tea. The root supports the leaf and fruit, and the leaf the root, so that neither can be spared without detriment.

This climate appears congenial to the growth of the plant, and the soil is so diversified in this mountainous district that there is no difficulty in selecting that best adapted to seed-growing plants, or that designed for the leaf only. Upon the plantation purchased this summer, I have light-yellow, dark-brown, and red clay subsoil, of a friable character, with a surface soil sufficiently sandy to answer the demands of the plant. I do not see any reason to doubt, from a year's experience, that the tea-plant in its varieties will flourish in what I heretofore denominated the tea-growing district of the United States, as well as in any part of China.

The slowness of its growth requires patience. But when once established, the tea-nuts will supply the means of extending cultivation, and the duration of the plant for twenty years diminishes the expense of labor. To illustrate the hardihood of the plant, I may observe, that notwithstanding the zero severity of February frost destroyed the leaves and branches of most of the plants, and those now blooming in great beauty and strength are from roots the growth of this summer, I have one green tea-plant the stem and branches of which withstood the frost of February without the slightest protection, and is now a splendid plant, covered with branches and evergreen leaves, affording undeniable evidence not only of its capability of resisting frost, but of its adaptation to just such a degree of temperature.

I have often remarked that the tea-plant requires for its perfection the influence of two separate and distinct climates, the heat of summer and the cold of winter. The thermometer in this vicinity during the heat of summer generally ranges from 74 at 6 o'clock A. M. to 82 at 3 o'clock P. M., only one day during the summer so high as 86.

This is a most agreeable temperature, nights always cool, which the tea-plant enjoys, and the days hot and fanned with the mountain breeze.

The drought I found the most difficult point to contend with, owing to the want of adequate means for irrigation. I lost 20 or 30 plants through this, and learned that no tea plantation should be established without irrigation. After two or three years there will be little necessity for it, because the depth of the roots will generally then protect the plant.

My plantation at Golden Grove is well supplied with water, or I should not have purchased it at any price.

It is the first and most important point to secure a southern or western aspect, a gentle declivity the second, salubrious air and suitable soil the third.

Our country is filled with natural tea plantations, which are only waiting the hand of the husbandman to be covered with this luxuriant and productive plant.

I know the public is naturally impatient of delay. Like corn, it is ex-

pected that the tea-nuts will be planted in the spring, and the crop gathered in the autumn. But they forget that the tea-plant does not interfere with any other crop, and when once planted it does not soon require a renewal.

I have sometimes felt this impatience myself, and longed for a cup of tea of my own growing, but I have never had one. As a husbandman, I must wait some time longer, and let patience have her perfect work.

Your obedient servant,
JUNIUS SMITH.

GOLDEN GROVE TEA PLANTATION,
GREENVILLE, S. C., *Dec.* 11*th*, 1849.

THE MANUFACTURE OF SUGAR.

Extracts of a Despatch from the Chargé d'Affaires of the United States in Belgium.

LEGATION OF THE UNITED STATES, BRUSSELS, *Oct.* 10, 1849.

SIR:—Mons. Melsens, Professor of Chemistry in one of the State Colleges, has been for a long time engaged in making researches with a view to render more perfect the methods employed for extracting sugar from cane and beets. The success which attended that learned gentleman's experiments soon caused a great sensation among the manufacturers and statesmen of France and Belgium.

This could not be otherwise in countries where so large a capital is invested in the growth of beets and the manufacture of sugar from them, in the refining of exotic sugar, and the important collateral interests to which they have given rise. A committee of the most distinguished scientific gentlemen of France and this country were appointed by the two governments, and in the presence of government officers experiments were made to test the efficacy of the new method.

Some of the facts discovered by Mons. Melsens soon became known to the public, and rapidly reached those interested in that important branch of manufacture in other parts of the world. Among others that visited this city, with a view of obtaining information on the subject, were some of our own citizens: one was the Hon. Mr. Chinn. But at that time nothing could be learned, as the process was kept secret. Applications have been made to me from persons engaged in manufacturing sugar in other parts of the United States requesting information on the subject.

In my conversation with Mons. Melsens, and in reading his memoir on the subject, I was struck with the importance of the discovery. I immediately commenced the translation of it, and now send you the first part, which chiefly relates to the manufacturing and refining of sugar cane. The second part, which relates more particularly to the extraction and refining of beet sugar, is not quite finished, but will be sent by the next steamer. It will be remarked that I have retained the weights and measures as they were given. They are simple, and their value easily ascertained. I would suggest the propriety of its early publication, as it will avoid the necessity of a large correspondence, and be satisfactory to numbers interested in the subject. Very respectfully your ob'd't serv't,

THOS. G. CLEMSON.

HON. JOHN M. CLAYTON, *Sec'y of State.*

New Method for the Extraction of Sugar from Sugar-Cane and Beets, by MONS. MELSENS, *Professor of the State Veterinary and Agricultural College of Belgium, Corresponding Member of the Royal Academy of Belgium, of the Society Philomathic, &c. Translated from the French by* THOS. G. CLEMSON.

THE extraordinary circumstances in which I am placed make it my duty to extract from a larger work on which I am engaged, the observations most proper to give an exact idea of the researches to which I have devoted myself. Whatever may be the success of my method for the treatment of saccharine substances, I am confident that all my observations will be found exact, and their knowledge may give rise to useful reflections on the part of those occupied in manufacturing sugar, and without doubt to new practical applications in its different branches.

It is a well known fact, that in healthy sugar-cane and healthy beets, all the saccharine matter may be crystallized. It is also known that this matter may be easily extracted by means of weak alcohol, which may be afterwards driven off by evaporation, and leave the sugar in pure and colorless crystals.

In bitter almonds there also exists a substance which may be crystallized by the same means, without losing its purity. But the effect is entirely different when water is used in place of alcohol. This substance found in bitter almonds (amygdaline) disappears or undergoes a metamorphosis, and by the change various new substances are formed entirely different from the original. That water should have this effect, it is necessary that it should come in contact with the air, and that it should encounter and dissolve certain fermenting substances which are found in the tissue of the bitter almonds with the amygdaline.

In the sugar-cane and beets there exist also these fermenting matters capable of transforming sugar into other substances. In order to produce their action, it is necessary that they should be placed in contact with the saccharine matter by means of water, and should themselves be exposed to the air. Every one knows with what rapidity the juice of sugar-cane changes character in the warm climates where it is made; and although this alteration is less rapid in the juice of beets, it is sufficient to create difficulty, and every means have been tried to make the manufacture as rapid as possible, in order to avoid this cause of trouble and loss.

For the chemist who makes any analysis, the problem of the extraction of sugar is solved by the use of alcohol. He, by this agent, separates the saccharine matter from the fermenting substances, and destroys the latter without injuring the former, thus preserving the sugar from any destructive influence. But for a large operation it is necessary that the agent should be cheap and easily managed. Alcohol is dear, its use requires the greatest precaution and is very dangerous. Setting aside then alcohol, is it impossible for chemistry to produce a liquid which has the properties essential for this case, and which, like alcohol, will prevent all fermentation, even when exposed to the air? I think not. I do not even pretend to say that the system which after many trials I have considered the best yet known, is either the only one or better than any other.

In the sugar-cane or beet there is saccharine matter dissolved in water, nevertheless this matter rests in that form a long time without change. If we could then make use of water as a dissolvent in the same manner that

nature does, we should extract the sugar without destroying its quality. The difficulties exist neither in the water nor the sugar, but in the air and in the fermenting matter contained in the cells formed by the tissue, which the contact of water puts in action. This being the case, is it possible to crush the cane, or grate the beet in a vacuum, and extract the juice and boil it without removing it from this vacuum? If it is possible to do this on a large scale, the problem is solved. But this system seemed to me impracticable, and I have not tried it.

It would appear easier to arrive at the desired result by operating with an inert gas, such as carbonic acid: to grate the beets in carbonic acid, to wash them in water charged with carbonic acid, and to water them upon the grater with water containing carbonate acid of lime, or carbonate acid of magnesia. My essays have not had the success I hoped. The least trace of air is sufficient, and these agents do not seem entirely to annul its effects. Their action is therefore uncertain.

I will mention here (only by way of observation) a class of bodies to which recourse is often had to prevent fermentation. These are the metallic oxides, capable of combining with the fermenting matters or the substances from which they are produced, and forming insoluble compositions. The oxide of mercury and the oxide of lead are in this category. For an analysis in the laboratory, the sub-acetate of lead may be easily and certainly employed, for it precipitates the fermenting substances and every thing capable of producing them, and leaves the sugar dissolved. But the unhappy consequences of employing it are too easily to be seen, and have been but too certainly realized every time it has been used in the manufacture of sugar, to permit me to believe in the possibility of using it.

The action of tannin and monohydrated phosphoric acid is different. These two agents coagulate the fermenting substances, precipitate the matters that form them, and purify without heat the juice of either sugar-cane or beets in a manner that renders their application possible.

I thought that I should approach the discovery I sought for in trying,

1st. To prevent fermentation during the extraction of the juice, and to avoid the contact of air while the juice was cold.

2d. To profit by the coagulation of the fermenting substances caused by heat, to carry them off, as is practiced in defecation.

For this purpose, I sought a substance having a great affinity for oxygen, without action on the saccharine matter or danger to man, cheap, easy to produce anywhere or to transport.

Three substances particularly fixed my attention: the bi-oxide of azote, sulphurous acid, and aldehyde. This remarkable class of compositions having a great affinity for oxygen, and which contain already two equivalents of this body, and absorb a third, with facility to produce acids, appeared to me eminently proper to fulfil one of the conditions mentioned, viz: to prevent by their presence the oxygen of the air from acting in producing fermentation. I have no doubt but that some one more capable than myself will ultimately succeed in giving a practical form to the bi-oxide of azote, for I cannot believe but that a substance which destroys oxygen instantly and forms with it an acid proper to precipitate the fermenting matters, will be one day employed in the extraction of sugar. Dissolved in the sulphate of iron, it would guaranty the juice from all alteration until the end of the defecation by lime, and, this accomplished, the juice would retain scarcely a trace of the reagents employed.

Aldehyde or the organic substances which resemble it are too dear; I therefore made no stop at them.

During all the experiments which I slightly mention, I found myself always inclined to return to the use of sulphurous acid. Its efficacy as an obstacle to fermentation is so well proved, its price is so low, its production so easy, and the substances necessary to produce it so universal. It is true that sulphurous acid, which was so successful in the hands of Proust when used to prevent fermentation in the saccharine matter of grapes, has always presented, when applied to the manufacture of beet sugar, insurmountable objections. I was not ignorant either that the most experienced persons had failed in the attempt to use it. Nothing practical has resulted from their efforts.

If sulphurous acid can be profitably used where the must of grapes is concerned; if in preventing fermentation it has no influence on the sugar, it is because it possesses at once these two properties, either of itself, or because it is converted into sulphuric acid by the action of the air. Every one knows, on the contrary, that the cane sugar is changed and takes the nature of grape sugar when placed in contact with acids, particularly with sulphuric acid. Thus, however inoffensive the sulphurous acid is when applied to the must of grapes, it is impossible to use it for the juice of the sugar-cane or the beet; for as soon as the air absorbed by the sulphurous acid changes it into sulphuric acid, the effect of this last on the juices mentioned changes them into grape sugar. Reflecting on this difficulty, I asked myself if sulphurous acid used with a powerful base, such as potash, soda, or lime, would still present this obstacle. I found, in reality, that the base, absorbing the sulphuric acid as soon as formed, left the sugar intact. From this period I was led to make many experiments, easy to reproduce, useless to repeat in detail, and which I will sum up in a few words.

Dissolved sulphurous acid, added to a solution of the juice of sugar-cane or beets, prevents fermentation, but destroys slowly the sugar if left cold in contact with the air. If heated, the destruction is much more rapid.

The neutral sulphites of potash, of soda, and of lime, do not prevent fermentation, but do not injure the sugar whether cold or warm. Neither of these products then would serve.

The acid sulphites, and more especially the sulphite of lime, presented, on the contrary, properties worthy of interest. Sulphurous acid in excess prevents all fermentation. The base which all these salts contain neutralizes the sulphuric acid as fast as it is formed. It remains to be seen if, by themselves or by their excess of sulphurous acid, they have or not the power to convert cane sugar into grape sugar.

I have heated for several hours small quantities of sugar-candy dissolved in water, with a large quantity of bisulphite of lime. The sugar was changed, it became uncrystallizable and deliquescent. The sirup thus formed presented sometimes an appearance with which manufacturers of sugar are well acquainted; submitted to the action of heat for evaporation, it remained motionless.

There was therefore the proper quantity to find out, and much care to be taken; but as it takes a great deal of the bisulphite of lime to destroy the sugar, and a small quantity to destroy fermentation, I thought this agent worthy of a closer examination.

Sugar-candy in cold water with bisulphite of lime, even in excess, crystallizes without loss, and without change, by spontaneous evaporation, at a

very low heat. It is, therefore, possible to manufacture sugar without artificial heat. Further on, the importance of this remark will be made manifest.

Perfectly white sugar-candy being dissolved in ten times its weight of water, I added half its weight of a solution of bisulphite of lime, marking ten degrees of the areometer of Baumé, and boiled it for about an hour. It was then filtered, to clear it of neutral sulphite which was deposited. It was afterwards put into a plate, where it crystallized entirely without a trace of molasses, leaving precipitated, however, a small quantity of the tartrate of copper, which had been dissolved in the potash. Straw-colored sugar-candy treated in the same way gives the same results, only that the crystals are lighter colored than the candy itself. The same experiment with all kinds of sugar produced the same results, whether the liquid, when evaporated, was left acid or had been carefully neutralized after boiling. I found also that the crystallization was as perfect and rapid when the liquid was left unfiltered as when it was filtered before the evaporation.

I have examined with the polarizing apparatus, following the method of Mr. Clerget, the sugars that were produced by these different treatments, and I found—1st. That the crystallized masses gave a direct notation almost identical with that given after the inversion. The differences, sometimes in one sense, sometimes in another, and confounding themselves with the errors of observation, proved that the sugar was not transformed, or that this transformation was practically insignificant. 2d. That portions of the liquids, taken at different stages before the crystallization was complete, presented to the eye all the qualities of cane sugar, and deviated to the right of the plane of polarization, and gave a direct notation almost identical with that observed after the inversion.

It resulted from this, either after crystallization, or in the sirup before crystallization takes place, that no difference is to be found between the sugar dissolved in pure water and that which has been submitted to the action of the bisulphite of lime, when the excess is not too great of the bisulphite, or the heat too long continued. It was then reasonable to suppose that the bisulphite of lime, used as a substance having a great affinity for oxygen, and as an antiseptic, would have no injurious effect on the sugar, if it was poured cold upon the beet grater, or the sugar-cane mill, in such a manner as to mix with the juice the instant the cells which contain it were broken. It was also to be supposed that it would endure the heat necessary for clarifying without injury. In this operation, judging from experience, the time employed would neutralize the bisulphite, leaving the juice purified from the fermenting matters, and prepared for evaporation, without loss of sugar. But I soon found that the bisulphite of lime possessed certain qualities which demanded further attention. White of egg, blood, the yolk of the egg in emulsion, milk mixed with water, when mingled with the bisulphite of lime, and entirely coagulated at a temperature of 100° (centigrade), these liquids, filtered and subjected to evaporation, leave residuums in which are found a small quantity of azotized matters, mixed with sugar of milk, or the salts of these substances.

To its antiseptic qualities and its faculty for absorbing oxygen, the bisulphite of lime joins very great powers of clarification. This gave me the idea of the following experiments. I mixed 50 grammes of sugar-candy, 250 centimetres cubes of milk, 250 centimetres cubes of water, and 50 centimetres cubes of a solution of bisulphite of lime, at 10° of the areometer of Baumé. I boiled and filtered to separate the parts that were coagulated. The concentrated liquid gave a mass perfectly crystallized, which, examined without drying or purifying, gave 92 per cent. of sugar by direct notation, and 93.5 after inversion by chloro-hydric acid.

The defecation was easy and complete. The sugar was preserved intact, the water adhering to the crystals, and the salt of milk found in the mass explain why there was only 92 per cent. of sugar in the 100.

I employed in another experiment 50 grammes of sugar-candy, half of an egg, white and yolk mixed, 25 centimetres cubes of milk, 75 centimetres cubes of water. This mixture, boiled and filtered, gave a liquid which crystallized without molasses.

The polarizing apparatus gave 85 per cent. of sugar by direct notation, and 86 after the inversion. There was then only the cane sugar and $\frac{14}{100}$ composed of hygrometric water, the excess of the bisulphite of lime, the salts of milk, &c.

The bisulphite of lime at 100° (centigrade) acts as a defecator. It separates the albumen, the casein, and, as will be seen hereafter, the azotized matters analogous, which exist naturally in the cane and the beet. This separation is effected without loss or change in the sugar, except that which may be estimated at $\frac{3}{100}$ of the mass, of which no count can be taken in experiments of this nature.

It remains at present to be seen what part the bisulphite plays in preventing the colorization of the sirup.

The coloring matter of cane or beet sirup comes from four principal causes:—

1st. The substances containing the coloring matters which are dissolved in the juice.

2d. The contact of the air and the pulp creates rapidly coloring matters which are added to the preceding.

3d. The heat employed in the evaporation in changing the character of part of the sugar, and the substances connected with it, forms also coloring matter.

4th. The air, the lime, and the ammonia, aided by heat, give rise during the evaporation of the juice, alkalized by the lime, to coloring matters.

The bisulphite of lime carries away almost immediately the coloring matter which exists in the cane and the beet. It prevents the formation of others during the process of manufacture, and especially of those which require to form them by the action of the air and a free alkali. The bleaching power of the bisulphite of lime with regard to the original coloring matters contained in the cane and the beet, is not absolute. It appears to act by a colorless combination which is formed between these substances and the sulphurous acid; this effect is well known to chemists. When there is a sufficient quantity of green matter to be seen in the stems or roots treated, we frequently see the sirup, after losing its color under the action of the bisulphite, become slightly tinged again as it concentrates, and again colorless when longer subjected to heat.

In preventing the coloring of the pulp, the bisulphite of lime is wonderfully efficacious, and so durable that too much cannot be said of its power. I have kept for six months in badly covered vessels the pulp of beets, which remained colorless from the effects of the bisulphite, when it is well known that, under ordinary circumstances, they would have become very brown from the action of the air. I do not hesitate to say that there are many

cases where the bisulphite might be most efficaciously employed to prevent the formation of coloring matters, which give so much trouble to destroy when once formed; such as those that stain the filaments of hemp, or of flax after steeping, and indigo after it is precipitated, bark juice employed in tanning, the extract of certain dye-woods, &c. But all these points will be examined hereafter. For this moment I content myself with the statement I made above, that coloring matters that are spontaneously produced without heat in the pulp exposed to the air, never make their appearance when the bisulphite of lime is used.

I will add that in the evaporation without artificial heat,—1st, of a liquid formed by dissolving in water cane sugar,—2d, of cane-sirup—and 3d, of beet-juice,—there will be no color where the bisulphite is used; and that where artificial heat is used for evaporation, the coloring is scarcely perceptible; nay more, that the sugar obtained by this process from red beets is completely colorless.

I have never observed perceptible discoloration except in rare instances, and even then it was so slight as to be of no consequence in the manufacturing of a large quantity.

It is thus proved that the bisulphite of lime may be used with success in the extraction of sugar from cane or beets,—

1st. As a powerful antiseptic, preventing the production or action of fermenting matter.

2d. As, from its affinity for oxygen, capable of preventing the changes which the presence of that agent causes in the juice.

3d. As an agent which at 100° (centigrade) defecates the juice, and removes from it all the albumen and coagulated matter.*

4th. As carrying away the pre-existing discoloration.

5th. As an agent capable in the highest degree of preventing the formation of coloring matters.

6th. As capable of neutralizing all the hurtful acids which may exist or be formed in the juice, substituting for them an acid almost inert, (sulphurous acid.)

It remains to be seen under what form or in what quantity the bisulphite of lime should be applied to the cane or beets.

What new facts may be discovered in manufacturing a large quantity, and what inconveniences may overbalance the advantages it seems to offer—this is now what I intend to examine, arguing from my own experience, without exaggeration, but also without timidity.

One of the thoughts which has the most sustained and excited me in the course of my researches, was the hope that, in the equatorial regions at least, sugar might be extracted by the heat of the sun alone. What would prevent, that, once preserved from change, the juice of the sugar-cane should be abandoned to slow crystallization in the open air, like salt in the salt marshes? I should say there was no obstacle, and I call to witness all those who have seen my experiments. They have all been of the same opinion. This opinion and this desire will explain why the experiments I am going to state have received the direction I have given them.

It is well known that there exists in Murcia manufactories for making sugar from cane. They have resisted all the vicissitudes that the commerce

* There remains, however, after this clarification, a matter which is colored by the air, or the influence of an alkali, first violet and afterwards brown. It is probable that it is an azotized substance.

of sugar has experienced for sixty years, and are still in full activity. It is from these manufactories that a friend procured me some hundred pounds of fresh sugar-canes for my experiments. They reached the laboratory of the Sorbonne, in Paris, where I made my experiments, in a good state. They were pronounced by persons who had been in the colonies, and were acquainted with the subject, to have been imperfectly ripened. A good many were worm-eaten. My experiments then, from such materials, could not be expected to be very satisfactory: nevertheless, the first essay I made filled with astonishment persons accustomed to the manufacturing of sugar and capable of judging of the results obtained.

The juice was extracted by a coarse grater, adding bisulphite of lime during the operation. It was clarified by boiling, and simply filtered through a cloth strainer. The concentrated sirup was filtered a second time, and left to crystallize slowly. This it did to almost perfect dryness. An analysis by alcohol could have given nothing better either in quantity or quality. It was even more colorless than sugar obtained by alcohol.

In these experiments all the sugar contained in the juice took a solid and crystallized form. The crystals were large and firm. They were not more colored than ordinary sugar-candy, which they resembled in appearance. The traces of molasses were almost imperceptible.

Taking into consideration the almost entire purity of the juice of the sugar-cane, which really, once clarified, is only sugar and water, and considering also the aptitude which cane sugar has to form large crystals, in which quality it is far superior to beet sugar, I am sure that the first colonist who attempts to evaporate slowly a quantity of sirup, will perceive that the crystals, in size, color, and appearance, are so superior that the advantages of the process will be entirely evident to his mind. I changed the proportions of the bisulphite of lime; I experimented separately on the ripest canes, on the greenest, and on the worm-eaten, and in all my essays the result was the production of crystallized sugar. I never found a spoonful of molasses that could not be crystallized.

The analysis of the juice and the action of the bisulphate on it were always the same, both as regards the substances contained and the quantity of sugar obtained.

The operation is so simple and so correct in its results, that it appears almost necessary to do wrong expressly in order to fail to extract all the juice from the sugar-cane. Every one knows that the juice extracted from the sugar-cane is sometimes not more than the half, never more than two-thirds of the quantity really contained in the cane. There remains then in the crushed cane at least a third of the saccharine matter. To extract this by washing in warm climates is impossible, on account of the rapidity with which fermentation takes place; but if the bisulphite of lime is mixed in the water used in washing, nothing is easier. There is no need for hurry, and the washing may be so perfect as to extract the last particle of sugar.

Thus obtained, these washings would be nearly as rich as the juice itself. Treated in the same manner by defecation at 100° (centigrade), simple filtration and concentration into sirup, and then slow evaporation, they would give the same results as the juice.

I tried with the crushed cane this method with a lively curiosity, and I succeeded in producing large crystals of pure sugar, and much superior in color to the best sugar sent us from the colonies.

Even more, and that for reasons that chemists had already discovered, the skimmings and the filters employed in filtration, after several days' exposure in the air and the danger of fermentation, yielded pure crystallized sugar. It was only necessary to wash all these substances in water charged with the bisulphite of lime and evaporate this water. Thus the bisulphite of lime rendered the sugar almost as unalterable as mineral salt; that of the juice, the crushed cane, the scum, and the filters produced the same large grains of a colorless or slightly yellow candy. All this requires neither care nor study, and nothing renders hurry necessary. As long as the bisulphite exists in the smallest appreciable quantity in the liquid, it prevents all alteration.

I know nothing of the colonies, and it would not, therefore, become me to pronounce if the employment of such a process would or would not have the effect of producing division of property, by enabling the negroes who inhabit them to extract the sugar profitably on a small scale; but I do not hesitate to say, that my essays proved that this change in the cultivation and in property is possible.

It may be objected that powerful mills are necessary to crush the cane. This is not so. A root-cutter and a grater are all that is necessary, because the washing is so complete by the employment of the bisulphite of lime, that all the juice may be extracted in that way from the cane, cut or torn in the rudest manner. However that may be, I will now give the method I arrived at in treating the canes which I had sent to me:—

1st. I broke up the canes by means of a beet-grater, watering the pulp during the operation with a solution of the bisulphite of lime. I then pressed out the juice, which was boiled, filtered, and evaporated by fire to the density of about one-third what the cold sirup should be, filtered again and left to slow crystallization. This gave me in a few days a mass of candy, from which it was impossible to extract any molasses.

2d. The crushed cane or pulp, whichever it may be called, was wet with water, submitted to another pressure, which produced another juice, less rich. This, treated like the first, gave the same results.

3d. I repeated again this last operation.

For all these experiments I employed one per cent. of the weight of the cane of a solution of the bisulphite of lime, at 10° areometer of Baumé. I took out the whole of the sugar, and found all of it in a solid form. My operations, though evidently susceptible of being applied to manufacturing on a large scale, presented at the same time a perfect analysis of sugar-cane.

If experienced chemists, who, like Mr. Caraseca, in Havana, and Mr. Arequin, of Louisiana, are in reach of sugar manufactories, will repeat my experiments on a larger scale, I am sure their opinion will be soon formed.

I will now mention the objection to my process. The sugar obtained by it has a taste of sulphur, but it loses this in three manners:—

1st. Crushed and exposed to the air, the sulphite becomes neutral sulphate.*

2dly. Exposed to an ammoniacal atmosphere, the sugar loses its sulphurous flavor, and often takes a taste of vanilla very agreeable, but it is sometimes slightly colored.

3dly. Clayed so as to lose about 10 per cent. of its weight, it gives a sugar equal to the purest and whitest sugars of commerce.

* As crystallized sugar does not contain solid bisulphite, but only neutral sulphite, this can only give neutral sulphate. If the sugar is acid, this acidity is derived from the acid phosphate of lime, formed by the action of sulphurous acid and the phosphate of lime in the juice.

The sirup used in claying may be regenerated by evaporation, and gives crystals similar to the others. For manufacturing, I recommend the third process. I will only, for the moment, slightly mention a circumstance that may cause difficulty. The sulphates and the sulphites are changed, by the contact of organic matter, into sulphurets. The formation of sulphurets, and the appearance of free sulphur, which would probably be the consequence, are not presented in any of the numerous specimens which I possess, and of which some of beet sugar are already quite old.

I recapitulate: 100 kilogrammes of cane contain about 18 kilogrammes of sugar, when in good condition. They yield 60 kilogrammes of juice, when well managed, and this gives 12 kilogrammes of sugar.

There is usually extracted from the juice from 6 to 7 kilogrammes of unrefined sugar. There is, therefore, a loss of 5 or 6 kilogrammes in the operation, besides which 6 kilogrammes are left in the crushed cane.

It results from this that, by applying the new process to the juice alone, 12 kilogrammes of refined sugar will be obtained in place of 6 or 7 kilogrammes of unrefined sugar. If the crushed canes are also submitted to this process, 17 or 18 kilogrammes of sugar will be obtained from 100 kilogrammes of cane; that is to say, the whole amount of saccharine matter contained in the cane may be extracted. In saying, therefore, that the yield of sugar from cane might be doubled, I stated nothing in which my experiments did not bear me out, and certainly was far from exaggerating.

The future will decide; I await its judgment with the most perfect confidence. The bisulphite of lime will enable the manufacturer to do all which the chemist can do with alcohol; and if the latter extracts 18 kilogrammes, the former will also one of these days.

Whether the evaporation should be carried on to the end by boiling; whether the sirup should be concentrated one-third, and finished in the drying-room; or whether the evaporation should be entirely carried on in cases exposed to the sun, is more than I am able to decide. Local circumstances and studies on the spot will determine this. I will only remark that the use of the bisulphite, by preventing fermentation, renders the use of large shallow cases or reservoirs of wood easy, and permits even rooms of graduated heat for drying.

I did not have at my disposal a sufficient quantity of juice to try these different methods, but I desire to show that they are worthy of essay, and I recommend to the attention of Mr. Caraseca, or any other chemist in a favorable position for trying it, the following experiment:

I took beet juice, to which I added four (4) per cent. of the normal solution of bisulphite of lime. Having clarified it, I put it into a pine case, which I had previously washed well with the bisulphite. The bottom was pierced with holes, each of which had a string passed through it, which hung down, and thus offered numerous means for the juice to run off, and a large surface for evaporation. As fast as the juice was collected in a vase placed under the strings, it was poured over again, and thus concentrated by passing several times; the sirup was placed in a flat vessel, where it crystallized almost entirely. In the little molasses which was separated from the crystals, new crystals were formed, and these last were as perfectly characterised as the first.

If, with beet juice, and an imperfect apparatus, this experiment succeeded, why should it not with cane juice, which is purer and richer, in hotter countries, in the open air, and with a more carefully arranged apparatus?

Why not seek, in the heat of the sun, where it is so intense and so certain, the means of replacing coal or other combustibles, which are not to be had?

Whatever may be the means of evaporation which experience may prove to be the best, the striking results obtained in operating on a few hundred pounds of cane has convinced me that the extraction of sugar in the colonies will hereafter follow new and more profitable methods. The juice and crushed cane being placed out of the reach of fermentation, I was, therefore, fully disposed to take immediately the measures necessary to insure a prompt essay of my system. This I hope to do, (with the aid of Mr. de Tracy, Minister of the Marine in France, who has shown me much kindness,) either in the French colonies or Algiers, where many well-informed persons think that the sugar-cane would succeed perfectly, and where the greater quantity of sugar given by my method would enable them to produce, at a low price, sugar which, from its favorable position, would command the market of the Mediterranean. But, while I was naturally tempted to confine all my attention to sugar-cane, which promised me a success incontestable, quick, and easy, I felt that I owed it to my native country, which has no colonies, and which cultivates the beet on a large scale, and to my master, who on so many occasions has aided the cause of native sugar, to endeavor by every means in my power to maintain the equilibrium between beet and cane sugar, which the results I had obtained threatened to overthrow. This is the point I aimed at in my reiterated experiments on the beet.

As the extraction of sugar from the cane requires crushing, or grating, defecation, slow or rapid evaporation and filtrations, it is very easy from this to form an idea of the operations necessary for the beet. There is, in reality, little difference. But, if the sugar-cane offered results so clear that there was no doubt on my mind of the advantages of the process I tried, the beet presented much greater difficulties to overcome.

Our sugar manufactories are much more advanced, and leave much less room for improvements. As the extraction of the juice is more perfect, there is a smaller loss in the pulp. As the pulp is used for the food of cattle, the sugar it contains is not in reality lost. Having coal very cheap, the process of evaporation by fire suits better. Finally, the juice of the beet containing a considerable quantity of salts, which prevent the crystallization of the sugar, there is a cause of loss which the new process cannot correct.

The calculation, in round numbers, appears to be this: 100 kilogrammes of beets contain, one year with another, 10 kilogrammes of sugar; 1 kilogramme in the pulp, 2 in the molasses, and 7 that the manufacturer can sell in the form of unrefined sugar.

Some manufacturers, they say, reach this quantity; but I should be disposed to think that, even in France, where this industry is so well understood, the general product does not exceed six kilogrammes, from which there results an absolute loss of 1 per cent. of sugar, which disappears during the operation. However this may be, I consider as the limit of all that is to be hoped from my process, for the moment, a yield raised to 8 per cent., or one-fourth, which would be 33 per cent. above the general yield, taking one manufactory with another.

But I have sought less to give to the large beet-sugar fabrics more perfect processes of fabrication, than to furnish means which can be easily employed by all, and are capable even of being used on a smaller scale on the farms themselves.

While I was studying the question in this point of view, Messrs. Claes were using, without my knowledge, processes of the same nature on a large scale. It is for them, consequently, to make known the results. For myself, as I have not yet had the means of judging of the operation of my method with the apparatus actually existing in the sugar manufactories, I can only give the results of my experiments in the laboratory.

First point to be considered—Can all the sugar contained in the beet be extracted? This cannot be doubted.

Washing the pulp with water charged with the bisulphate of lime is an operation entirely in the scope of a manufactory, and done systematically will give a liquid very like the juice itself, and containing nearly as much saccharine matter, and leaving the pulp very nearly if not entirely exhausted. The washings thus obtained might be thrown on the grater, to preserve the new pulp from fermenting.

For the exhausted pulp, I am not ignorant that it is considered injured as food for cattle by this extraction of all the saccharine matter. This experience will decide; but I should be inclined to doubt that this pulp, which, after the washing, is still so rich in azotized and other similar matters, can have lost its alimentary properties. Exhausting the pulp, and afterwards adding to it the molasses, which would give it the sugar and the salts it needed, would seem to me a reasonable and logical operation. Experience alone could decide what quantity of molasses could be supported by the cattle. What I wish to prove is, that the exhaustion of the pulp is very easy, in itself considered, when a liquid can be used which prevents all alteration and fermentation, and permits as much time as is necessary to be given to the operation.

The absolute loss of 1 per cent. of beet sugar, or of 10 per cent. of the original saccharine matter, is not, I am convinced, exaggerated. It is, I think, really under the truth, and on this point I do not doubt considerable amelioration may be obtained.

From whence comes this loss if it is not from the scum, in the animal black, and in the filters, or from the loss from fermentation? The employment of my process prevents these losses. As to the animal black, its consumption will be much reduced in the refining of common sugar. As to the scum, the bisulphite has a double action, the importance of which I do not think I exaggerate. It determines more easily and more completely the coagulation of the albuminous substances, which form the scum: besides which, it produces a scum on which the air has no effect, and which does not ferment. If the operation on a large scale causes difficulties in this respect that I do not perceive, the addition of a few milienes of the bisulphite would suffice to prevent them. It is plain, that to prevent fermentation in the sacks, filters, and instruments employed, it is sufficient to wash them with water charged with bisulphite, before and after using, as Messrs. Dubrunfant and Kuhlman have already advised. From all this I concluded that a well-directed use of the bisulphite of lime will enable us to extract the sugar heretofore left in the pulp, and prevent losses by fermentation. If the removal of these two causes of loss or of destruction adds 2 or 3 per cent. of sugar for the 10 contained in the beets, the operation is not without interest.

I will now speak of another cause of loss. This is the presence of the salts, which are considered as being the principal causes of the formation of molasses. I have observed all the inconveniences that are attributed to the

action of the various and abundant salts contained in the beet. With the sugar-cane a small portion of the bisulphite is all that is necessary, for the washings give results as exact as if alcohol had been used. The reason is, that there are little or no salts in cane juice; with beet juice it is another thing.

However this may be, the treatment by the bisulphite always differs from the treatment by alcohol, precisely because the water of the juice dissolves the salts, while the alcohol does not. It is rare that the crystals of beet sugar can be obtained in distinct form, and they are difficult to produce. On the contrary, sugar-cane gives crystals perfect and easily formed. Therefore there has generally remained, if not molasses, soft sugar, in treating beets.

Admitting, however, the incontestable influence of the salts on the crystallization of sugar, I cannot accept it as the only cause of the formation of molasses or soft crystals. If this was so, in evaporating 40 litres of juice and burning the residue, and adding the salts thus obtained to 10 litres of juice, this juice ought not to furnish crystallized sugar. Now it is very easy to ascertain that this quantity of the salts contained in the beet would not have such an influence.

The production of molasses must, then, be attributed to other causes, independent of this. It would, therefore, be inexact to say, that a process which did not destroy the salts must, for that reason, be without influence as regards the formation of molasses. All my experiments prove the contrary. I have never been able entirely to prevent the formation of molasses, but all the manufacturers are convinced that I have reduced it to a much smaller quantity than the operations actually employed have succeeded in doing. They may, I believe, with confidence continue their efforts in the same direction.

I have been assured that in some of the French sugar fabrics, directed by persons of great experience, the yield of sugar has been carried to eight per cent. of the weight of beets (about one-fourth). This result confirms fully the opinion at which I had arrived by my own researches. I shall be happy if I succeed, by the certainty of my process, in enabling all to do what it has as yet been in the power of but few to accomplish.

I shall at present endeavor to reply to some questions of great importance to large manufacturers. I shall do so with sincerity, leaving operators and men of business to decide what my opinions are worth in that respect.

The manufacturing of sugar has taken such a start in certain parts of the continent that it has given rise to establishments specially devoted to the fabrication of machines used in it, and also for making and restoring the animal black it consumes. There are also distilleries for the consumption of the molasses, from which they extract the salts and the alcohol contained, with profit to the country. All these industries are uneasy.

If the use of the bisulphite be adopted, the new conditions which it will introduce may open new vistas to invention which I cannot foresee. It seems to me, however, that graters will be always necessary, at least until the effects produced by washing the sliced beets obtained from root-cutters shall be more studied. It has even seemed to me so far, that the juice obtained by macerating or soaking was more easily operated on than the natural juice coming directly from the presses and graters.

I do not dare say, certainly, that the presses actually in use will be preserved, even if the graters are. They are calculated for very rapid operations, but when once the juice is rendered unalterable, slow presses, operating on large masses, economizing labor, suppressing the sacks and the racks, may offer certain advantages and obtain a just preference. Defecation by means of the bisulphite being carried on in the same manner as when lime is used, the boilers for this operation will continue indispensable.

The Taylor filters, or those of the same kind, will be as much needed in the new as the old process, unless it be found practicable to operate by deposit, which is possible.

The apparatus for evaporating by fire might be used in the commencement of the concentration of the juice, but towards the end it would be necessary to have recourse either to rapid crystallization by means of boilers heated by steam, or to slow crystallization by means of stoves. I am sure that either sheet-iron, cast-iron, tinned-copper, or tinned-iron, and probably reservoirs constructed of wood, or bricks covered with cement, may be used.

The use of animal black may be either suppressed, reduced, or continued, according as it may be desired to manufacture refined or unrefined sugar. As to the molasses and the salts contained in it, they might always be employed, except the portion that was thrown on the pulp for the nourishment of cattle.

Agriculture in France requires a quantity of marine salt. It would be much more reasonable to desire salts having potash for base. Now, when it happens that, in a country like the Northern Department of France, where nothing is lost, and where there is such an abundance of these salts in the molasses, and when it is only necessary to give this to the cattle, in order that these salts should be returned to the earth in the form of manure, it is to be supposed that they will soon find reason to cease the exportation of molasses and the salts obtained from it, of which they may be said to rob their land. Countries which produce sugar may export as much of that product as they desire with impunity. Air and water return the elements, but the salts contained in the molasses, once carried away, are not so easily found again.

To exhaust the pulp of all the crystallizable sugar contained, and return a portion of molasses with the salts it contains, would be in my opinion the most reasonable proceeding, taking into consideration the general economy of the country. But, in order to render this method acceptable to private interest, it is necessary that they should find an immediate profit. To do this, there should be a greater profit in extracting the sugar from the pulp than in selling the molasses. Practice on a large scale can alone prove whether this advantage exists, as I think it does.

The indications which I have given above will render easy to every one interested in the different industries connected with the manufacture of sugar, the appreciation of the facts that I have proved in the treatment of the beet.

I grated beets, and watered the pulp with two and a half per cent. of the weight of the roots of a solution of the bisulphite of lime. I pressed the pulp and collected the juice, which I boiled. I clarified it, and passed it through a cloth strainer, and analyzed it by means of the polarizing apparatus. I concentrated by boiling the clarified juice to the consistence of a sirup, which was filtered and placed in a stove, where it formed crystallized masses of a straw color, and the crystals were also examined by the polarizing apparatus.

The analysis of this humid mass, thus made, enabled me to determine the portion of its weight corresponding with true sugar, the rest being represented by water, salts, &c. 4 litres, 356 of juice, containing 521 grs. 4 of saccharine matter, gave a crystallized mass containing 528 grs. 2 of sugar. 0 litre, 984 of juice, containing 105 grs. 8 of saccharine matter, gave a grained mass containing 104 grs. 9 of sugar. 1 litre, 045 of juice, containing 112 grs. 4 of saccharine matter, gave a grained mass containing 113 grs. 1 of sugar. By which it is proved that during the defecation, the first concentration by boiling upon the naked fire, the second concentration in an oven, and the crystallization which was produced, the sugar treated by the bisulphite of lime is preserved without loss or alteration.

In all my experiments the same exactitude was manifest. The differences, always small, sometimes in one sense, sometimes in another, were not generally more than two or three hundredths, a quantity too small to be appreciated in practice. The pulp, being steeped in water and pressed a second time, yielded again a sweet liquid. Washed again, the liquid was not perceptibly sweet. A little bisulphite was added for the last washing. These liquids, mixed together and treated as before, yielded crystallized masses exactly similar to the first. The sugar in these masses corresponded in weight with what the analysis gave in the liquids that furnished it.

The scums and the sacks, washed in their turn in water charged with a little bisulphite, furnished, notwithstanding their exposure to the air, rinsings, which were left for ten days, and all that came from the experiments of each day was added. At the end of this time it weighed four and a half (Baumé). They were treated by defecation, &c., like the beet juice itself, and the result was crystallized masses almost equal to those obtained directly from the beet.

During the long time that I was engaged in making these experiments, I treated beets of all sizes and all colors; red, yellow, white, of every age, young and not arrived at maturity, decayed as well as those that were perfectly sound. In every case the crystallized mass that I extracted contained the sugar unaltered, that previous analysis had indicated. The differences observed were to be attributed principally to physical causes, for the sugar obtained did not always present the same aspect. Beets rarely gave as fine products as sugar-cane. Instead of a firm and well-formed grain, the solidified masses had confused crystallization.

Chemists and manufacturers who are accustomed to manipulating, (the excellent method of assaying given by Mr. Payen,) may convince themselves by a very simple experiment. They have only to treat a dozen beets by the bisulphite, and evaporate the juice after defecation, first to 25° of Baumé. At this point clarify and filter, or even filter without clarification; evaporate afterwards to thirty-seven or thirty-eight degrees Baumé, and leave it for three or four days in an oven at 40° centigrade. The crystallized mass, well pressed, will give an unrefined sugar of a fine color, and of a richness in sugar not only theoretically but practically realizable (as the essay by Mr. Payen's method indicates), which will surpass the yield of all the operations of sugar manufacturers.

But whoever tries to treat beets by the bisulphite will soon discover that there may be extracted from the juice they yield from thirteen to fifteen per cent. of the weight of this juice, of a thick residuum, which, well pressed between folds of filtering paper, leaves from seven to ten per cent. for the weight of juice of white sugar. After having been present at the first of my experiments, which took place before the French committee, Mr. Clerget, one of its members, in his first experiments made with my process, arrived at the same result.

The sirup boils up very rapidly when the bisulphite is used, but this inconvenience may be easily remedied by employing a little grease, or, what is better, oleic acid. I was not able to account for this fact. It would seem that this phenomenon required that another form should be given to the vessels used for evaporating the juice, especially when it came from unripe beets. I found that my process enabled me to extract sugar from defective and decayed beets as well as from those that were sound. The product differed little in appearance, and the quantity indicated in the beets was found entire in the crystallized masses obtained.

In comparing the well-known practice of the fabrics of beet sugar now in operation with what seemed to be the results of my process, I perceive the following circumstances: The grating of the pulp is done at present in the open air, without any special precaution. The alterations to which this gives rise renders a rapid pression indispensable; but however rapid this may be, it cannot entirely obviate the difficulty. The defecation by means of lime does not prevent but even increases the discoloration, and renders the employment of animal black necessary as a bleaching agent, and an absorbent of the excess of lime. Evaporation at a high temperature modifies a part of the sugar which heat renders uncrystallizable, from which results the necessity of operating by several successive boilings, and the solid sugar is extracted in four or five crystallizations, less and less productive.

By my process the beets may be grated some time in advance, and the pulp of the day before may be slowly pressed several times, and exhausted by washing. The defecation, leaving the juice limpid and colorless, renders the employment of animal black useless.

The juice, evaporated first at an elevated temperature to the density of about 1.3, then concentrated in an oven, crystallizes without color, and solidifies almost entirely, which gives almost the entire product in the first operation.

I was therefore always brought back to the employment of the process of slow crystallization, to which Mr. Crespel-Delisse owed the success which saved from ruin the fabrication of indigenous sugar in France in 1827. In adopting it, I felt sure that by the employment of the bisulphite this process had become much more simple and easy, and that the yield would be much more increased. I was stopped by two difficulties:

Would cattle eat the pulp treated by the bisulphite, and would it not be injurious?

Would the purified sugar offer any special difficulty in refining, or produce any cause of depreciation in the consumption?

It was not possible to decide this question in the laboratory. It requires the manufactory on a large scale to arrive at certainty.

I had arrived at this point when Mr. Paul Claes, manufacturer of beet sugar at Lembecq, came to Paris as one of the committee charged with a special mission by the Minister of the Interior of Belgium to give an account of the results of my researches. He commenced by telling me, with his well-known frankness, that he had himself tried a process that was probably analogous to mine, but that, in case of coincidence, he acknowledged that the deposit of two sealed packets made by me in the archives of the Royal Academy of Belgium and the French Institute, assured my priority.

He gave me in writing the results of his operations in the following terms:

We treated at Lembecq by sulphurous acid near 2,500,000 kilogrammes of beets in the last year. The liquid sulphurous acid, at 4½ Baumé, diluted with 200 times its volume of water, was poured upon the grater.

The beet juice was clarified by lime at about 60 degrees. Chalk was added. Very large lumps were obtained. The clarified juice was almost without color. During the whole operation, no discoloration was discovered that could not be traced to extraneous causes.

The quantity of sugar extracted was greater than usual. The color, without claying, finer; the grain, finer and richer. This sugar, resembling in every respect the finest sugar made, was most favorably received in commerce. Some time afterwards Messrs. Claes, brothers, sent me the fourth products refined and the fifth unrefined, which fully justified the preceding assertions.

My joy was great, I avow, in learning on one hand that sugar treated with sulphurous acid could be easily refined, and offered no difficulty to consumption, and to know that the pulp of 2,500,000 beets treated with sulphurous acid had been eaten by cattle without difficulty. The question of the yield, in comparison with what it had been before in each fabric, yet remained to be decided. It was sufficient for this that I found it had been increased at Lembecq by the use of sulphurous acid.

Mr. Paul Claes thought, with me, that the direct use of bisulphite of lime was preferable to that of sulphurous acid.

Up to this time my researches had been pursued in the calm of the laboratory, but one cannot touch with impunity questions connected with great interests.

The results of my experiments had transpired. The manufacturers of the Northern Department of France became uneasy. The colonial delegates addressed themselves to the Minister of the Marine, in France, and, at their request, the French government named a commission for the examination of my process. The silence so long guarded by the Belgian government was necessarily broken.

In its first sitting the French commission decided that it was necessary, for the security of my operation, that I should have a patent. I immediately took out one, as a means of preventing individuals from paralyzing my efforts and those of the government. We wished the French and Belgian manufacturers to enjoy the advantages of my process.

To judge of the value of a new system in a fabrication like that of sugar, it is necessary to make a series of experiments at different epochs on a sufficiently extended scale.

I publish at present, therefore, this first memoir, in which I have sought to establish precisely the essential facts; and I entreat all the Belgian and French manufacturers, who think it comports with their interests, to make, during the year, a series of experiments, either on the cane or on the beet, making what use they please of the processes which they find described here. I shall be pleased to receive their communications. What I seek is the truth. When my experiments have been verified, as I desire all the world shall have the proof, I wish to insist on one point. The bisulphite, poured upon the grater during the first operations of manufacturing, renders the juice unchangeable. It permits the maceration of the pulp, and its second pressure after having steeped it in water. It corrects the bad condition of the beets towards the end of the season, and renders the fabrication uniform and regular. Let it be essayed in these conditions, in confining its employment to that of a preservative. The capabilities of the manufacturers and the workmen will do the rest. This new process will become gradually familiar, and it will be easier to seize the most favorable conditions for its employment.

If, contrary to my suppositions, the manufacturers of native sugar find no profit in the employment of my process, I shall not for that reason believe that no further benefit can be derived from it in our climate. When all that is necessary to extract easily from 1000 kilogrammes of beets, and to produce finer and whiter unrefined sugar than that now supplied is a root-cutter, one or two barrels and a boiler, such as is used in washing, with a few earthen vessels, is it not to be hoped that the always increasing consumption of sugar will render popular its fabrication throughout the country, and bring in its train all the benefits of the culture of beet? Thus the wish of Morel Vindé may be soon fulfilled.

At the same time agriculture will gain one of the greatest fertilisers, and the laborer the benefit of the consumption of a healthy article of food, at present unknown to him. For, while England consumes more than 10 kilogrammes of sugar per head in the year, the whole of the rest of Europe does not consume more than 2½ kilogrammes per person in the same time.

Whatever may be the method of operating on a large scale, I cannot sufficiently dwell on the importance of the application of the preserving bisulphite to the juice the moment it comes in contact with the air.

For the rest, it is easy to understand that, taking the facts and principles I have given as a base, those employed in manufacturing may put them in practice in various forms. Hereafter I will publish the comparative results of the essays I hope to be able to continue. I will confine myself to indicating here some of these forms:

1st. Defecate the pulp itself.

2d. Defecate the juice from the presses, or from the washings, by means of the bisulphite of lime alone. Filter, through Taylor's filters, and draw off clear after the defecation. Boil directly this limpid solution, notwithstanding it becomes troubled during the concentration.

3d. Defecate by the bisulphite of lime; filter or draw off; evaporate to 25° Baumé.

4th. Defecate by the bisulphite of lime; filter or draw off; evaporate to 25° Baumé; filter; carry the concentration no further than about 38° Baumé. Crystallize slowly in an oven, by the method of Mr. Crespel-Delisse.

5th. Put on the pulp a weak dose of bisulphite to preserve it; defecate in the ordinary manner by lime; filter, or use animal black; add bisulphite sufficient to obtain a neutral or slightly acid liquid; evaporate to 25° Baumé; filter and boil.

In all these cases good results would be obtained by returning the sirup that runs off to the boilers for defecation, but it must be understood that this operation cannot be repeated more than a few times.

6th. Defecate by the bisulphite; filter or draw off; concentrate the juice to about 25° Baumé; neutralize it, or render it slightly alkaline; make use of animal black, and afterwards proceed by the old methods.

7th. Pour upon the grater a weak solution of the bisulphite; defecate with lime; operate afterwards in the usual manner.

Before finishing, permit me to recall, in a few words, the experiments of

learned men, or practical manufacturers, who have preceded me in the work I am engaged in.

We have all taken our point of departure from Proust, whose name will always be honorably connected with the history of sugar.

Independent of the well-known use he made of the change operated by the sulphite of lime for the extraction of grape sugar, this illustrious chemist indicates, in the Journal of Physic for 1810, the application of sulphite of lime for the juice of the cane, the maple, &c. It is to him, then, that is due all the honor of the discovery. Sooner or later his opinion must triumph. My happiness will be to have disengaged it from some difficulties, and to cause it to be accepted in practice.

Some experimenters followed this indication. Mr. Drapier in 1811 employed sulphurous acid. Mr. Pepère failed in 1812 in his essays with the same acid.

Mr. Jordan de Haber recommends the use of sulphurous acid for clarifying, but he employs, without distinction, sulphurous and sulphuric acids, or lime.

Mr. Boulin took a patent for the employment of sulphite of alumine in 1846. The use of this salt had been already indicated by Mr. Stollé, in a patent taken in 1838.

Mr. Merge took out a patent for the use of sulphurous acid and the sulphuret of calcium, which had been already proposed by Mairet de Reims for grape sugar.

In this rapid enumeration I purposely omit two patents, which give a full description of the employment of sulphurous acid and the sulphites—one by Mr. Dubrunfant, dated 1829; the other by Mr. Stollé, dated 1838.

No one will suppose, I am sure, that I had the intention of setting aside the experiments of a person so worthy of consideration as Mr. Dubrunfant. One thing astonishes me which is, that his penetration did not enable him to discover the reason of the failure of several of his processes.

The patent of Mr. Dubrunfant is printed in vol. 27 of the Collection of Expired Patents. Instead of discussing it, I refer the reader to the patent itself.

The patent of Mr. Stollé is printed in the Collection of Expired Patents, vol. 67. Manufacturers and chemists will appreciate at once where Mr. Stollé and I differ. They will give their just value to the points we start from, and will see upon what facts we base our theories.

For the rest, far be it from my thoughts to give myself the credit of the application of the principle of change to cane and beet sugar. I acknowledge that the credit all belongs to Proust, and that we have only followed him. There remained something to be done to render practical the happy and original idea of this great chemist in the manufacture of cane sugar, as well as that of the beet. If I have succeeded in this, I am willing all the honor should be given to Proust.

NOTE.—The translator is not only struck with the importance of the above discoveries with reference to the cane and beet, but cannot help thinking that they may be applied with success to the extraction of sugar from the stalk of the Indian Corn. T. G. C.

THE DEGENERATION OF THE SUGAR-CANE.

IBERVILLE, LOUISIANA, *January* 28*th*, 1850.

DEAR SIR:—I wish to call your attention to the subject of the sugar-cane, hoping that you will be able to render important aid in procuring seed, or a new variety from its native country, where it produces prolific seed. Last year a portion of the cane which was reserved for plants was spoiled, so that the planting was short. This year it is still worse. I reserved sufficient to plant one hundred and fifty arpents: but they will not plant seventy-five. And besides, there is no certainty of getting a good stand when the seed is defective.

It was generally supposed that the cane was spoiled in the mattress, by the continued warm weather after it was mattressed. But I am confident that it is a disease of the plant, and that, unless a remedy can be found, the great sugar interest of Louisiana must fail. While grinding in November, I noticed that some of the cane brought to the mill had, instead of a bright, healthy appearance, a dull, dead hue; and on examination, I found the centre of the bud of a dark color, with red around it. The centre of the lower end was hollow, and the upper end had a whiter color than is natural. After being exposed for a few days, the buds became entirely dead and black.

There was a very good description of the sugar-cane in the Patent Office Report for 1848: but it is an error to suppose that the cane cannot be propagated from the seed. This may be the case when the seed is obtained from plants that have been produced for a number of years from buds, or eyes. All plants that have been produced in this way for a series of years lose the faculty of forming prolific seeds; and the sugar-cane is governed by the same laws which govern the whole vegetable kingdom. It cannot, therefore, be expected to produce seeds after it has been cultivated for a great length of time.

The *Creole* or *Crystalline* cane has been cultivated in the West Indies more than two hundred years. The *Otaheite* and the *Ribbon* were introduced there by Lieutenant Blight from the South Sea Islands, where he found them growing wild; and no doubt they continue to grow there yet, and to produce seeds that will germinate with proper care and attention. I suppose that the Ribbon canes are hybrids. The *Violet* or Bourbon cane is the species which is best calculated for this country (although there may be other varieties equally good that have never been introduced here), and of this I would like to obtain the seed. Several kinds are cultivated in the East Indies different from any of ours.

The remarks in the last year's Report about planting tops and the poorest cane are very just; and this practice cannot be too much reprobated. As Mr. Benjamin says, the Creole cane has been run out by that process; and no doubt the Ribbon and the Violet have become degenerated in the same way, so that it is now necessary to obtain a fresh supply. From your official position in the Patent Office I trust you will be able to render us some assistance, by causing directions to be given to our foreign consuls or naval

commanders who may visit the South Sea Islands, to make inquiries and procure the grain, if it can be had, and, if not, all the different varieties of the cane which can be found. It may perhaps be difficult to preserve the cane during a long voyage, but I suppose it could be preserved uninjured a length of time, if packed in sand well dried, and kept in a cool place.

You are better qualified, however, for giving such directions than I am. Should you need any assistance from the President in promoting this design, I am confident that it will cheerfully be rendered, as he takes much interest in the agriculture of our country; and I should have written to him on the subject, but disliked to trespass upon his time, which I know is entirely occupied in the faithful discharge of his official duties.

Very respectfully, &c.

J. PRITCHARD.

BACON FOR EUROPE.

As a matter of interest to farmers as well as packers, we copy the subjoined circular of Allen and Anderson, who are among the oldest and most extensive provision dealers in England:—

CIRCULAR.

LONDON, 1st *October*, 1849.

SIR:—The growing importance of the trade in provisions from the United States induces us to offer a few remarks on the business of the season now closing. That it has been an unprofitable one to almost all concerned, cannot be doubted. That it has, notwithstanding, taken root as an increasing branch of commerce, is proved by the import returns; and that the consumption in this country has been greatly stimulated by the immense supplies thrown in, is we believe beyond all question.

Commencing with bacon, the imports of American into London were—

In 1847	14,161 cwt.
In 1848	70,823 "
In 1849 (9 months)	140,096 "

A considerable portion of which was soft, oily, inferior quality; and to this circumstance more than to the great quantity, the serious declension in prices and consequent heavy losses to the shippers are attributable.

The article best adapted to the London market is singed sides of about 56 to 64 lbs. each. Some of the early arrivals of these last winter came of very fair quality, and the meat of a good firm texture. The dealers, tempted by the prices being from 12*s.* to 15*s.* per cwt. under the Irish, at once introduced them to their customers; nor did a decline of 8*s.* on the Irish abate the demand for the American: and we have little doubt that, had the quality and firm texture continued to improve, the Irish must have gradually yielded, as to any weighty supply, to the cheaper production from the United States.

But the subsequent arrivals were comparatively so carelessly put out of hand, so soft, oily, and inferior, and so mixed in sizes, that Irish sides were again preferred, even at advanced rates, while the American became and continued a dull, dragging trade—many of the best dealers abandoning the article altogether.

It remains to see whether the defects above alluded to in the American bacon can be remedied the coming season; whether an article can be profitably sent from the States that will command a sale of 8*s.* @ 10*s.* under the price of Irish, and maintain its ground on its own merits.

Shippers must, however, calculate on a currency for the best sides of probably 34*s.* @ 38*s.* 40*s.*, here. The Irish will be in greater supply than last year, though still insufficient to meet the wants of the country; while the low prices of all other descriptions of food will prevent any very high rates ruling for bacon.

Ice-cured singed Sides, or shipments made during the summer heats, do not answer; the meat sustains in all cases an injury that lowers the price, and in some instances has done so to the extent of 50 per cent. Shipments of singed meat by New Orleans ought, for the same reason, to be avoided altogether, or made only in the months of December and January.

We have referred more fully to the article of singed sides, because it is the leading one of the London trade, and we expect may be made most profitable to export from the States.

Scalded Sides, of similar cut, are saleable at 4*s.* @ 6*s.* under singed, and where the length of the transit might cause liability to heating, are to be preferred.

Boneless Long Middles and small Square Middles, either boneless or with the rib in, are the next best articles adapted for this market. Some of the first arrivals of these last year were very fine, and met a prompt sale at 40*s.* @ 45*s.* up to 48*s.*, but the subsequent immense shipments were of such mixed, and commonly of such soft inferior quality, and also of such large sizes, that not only did the market for all kinds break down, but the character of American bacon generally was injured, and even the best articles swamped by the quantity of inferior.

Boneless Long Middles should weigh from 40 lbs. @ 50 lbs. each, the smaller preferred. Short Square Middles from 18 lbs. @ 25 lbs. each. All bacon is best packed in well-seasoned boxes, to contain about 3 cwt.

Hams this year have come out of superior cut and cure, but the bulk are still obnoxious to the serious objection of over-saltness. This is a fault so fatal to a quick sale, that it ought studiously to be avoided; less than one-half the salt would be sufficient; nor, when packed for export, need there be beyond a very slight sprinkling put into the cask. In the past season, heavy losses have accrued in consequence of the late period at which large quantities of hams arrived. There is always a falling off in the demand towards the end of July; it is therefore unsafe to venture on shipments after June. We had a brisk demand at 40*s.* @ 46*s.* for the best sorts, up to the 10th of July; whereas, since then nearly all kinds have been unsaleable at 30*s.* Some smoke-dried small sized hams, of excellent quality and handling, arrived last January, and met a ready sale at 64*s.* Dried hams should be from 10 lbs. @ 14 lbs. each, in casks of 5 @ 6 cwt. Hams in salt should be from 15 lbs. @ 25 lbs. each. Long cut are in all cases preferred.

Shoulders should be mild as possible, the weightier the better, and if the whole neck end of the side be left on, they bring 2*s.* @ 3*s.* more.

Tierce Middles, *Strips*, and all *pickled meats* for domestic use, have been in singularly bad demand throughout the past season, and still continue so. We are unable satisfactorily to account for this, unless it be from the abundance of, and low ruling prices for, other middles. The sizes best suited for sale here are 10 @ 15 middles per tierce of 336 lbs. Strips generally run too fat by at least half, and are in consequence now quite neglected.

Prime Mess Pork has been a losing article. Some few of the first arrivals of New York and Baltimore brands came of prime quality, and brought remunerative prices. But almost all the Western brands have come particularly bad, defective in cure, wretched in color, and the meat soft and inferior. The pressure to sell them caused the market to give way, and the subsequent glut of similar inferior kinds prevented all hopes of a rally, and operated most injuriously upon both the prices and character of American pork. The stock still on hand is very considerable. Fair good quality, though offered at 40*s*., and the inferior descriptions, though offered at 32*s*. @ 34*s*., find few buyers; whereas, had the article been of really prime quality, all would have been cleared off at 50*s*. and upwards.

The chief defect in almost all American prime mess pork is the color. Instead of being the bright cherry red, characteristic of skillfully pickled meat, it is a dirty, dull, unsightly brown. That this is remediable, and arises in the manufacture, is proved by some few brands coming otherwise. But unless it be obviated, the preference will continue to be given to Irish and Hamboro, although inferior meat, at much higher prices. The low prices at which the government contract for 6000 tierces for the navy was taken last week, are evidence that the Irish and Hamboro manufacturers look to get the raw material very considerably under the prices of last year. There are already sellers of Irish prime mess for Nov. and Dec. at 64*s*.; and judging from present appearances, we think that American best brands will rule at from 50*s*. @ 56*s*.

Beef needs little remark. The great bulk of the large shipments of last year came of excellent color and quality, and though prices lowered in consequence of the quantity arriving, yet the stock has been nearly all got through, and the character of the American beef confirmed as being superior to the Irish. The absence of the usual government contract this year, owing to a sufficiency in store, will cause the Irish shippers to compete for a share of the trade. But at about present rates we expect a large demand for the best kinds of American.

Lard has been in considerably less consumption the last eight months, arising chiefly from the serious reduction in the price of butter and tallow; both these articles continue low, and disappoint the sanguine expectations of many as to a smart advance in lard. The experience of the past season proves that lard in white kegs, refined in the States, does not answer. The English refiners turn out a neater and firmer article, having the advantage of a delivery at once to the dealers, without the liability of heating and injury during the passage. These kegs are at present in active demand at 42*s*., while the American are very unsaleable at 34*s*. @ 36*s*.; we therefore recommend shippers not to refine their lard, or put it up in expensive packages. The same remarks are in a great measure applicable to bladdered. Unless very neatly put up and carefully packed, it is extremely liable to breakage in the transit, and is also a difficult sale here, except the quality be very superior. The demand for bladdered is in fact giving way to the increased inquiry for the English refined in kegs, which are now turned out

of hand so improved in quality, and so neat in package, that they are taken in families in preference to bladders. Seventy tons of American bladdered lard were bought three weeks since at 87*s*. for the sole purpose of remelting, and about 20 tons of inferior do. at 82*s*. for chandlers' use.

We are sir, truly yours, ALLEN & ANDERSON.

The most saleable styles of bacon, middles, and hams, in the Liverpool and London markets, are represented in the annexed figures:

Fig. 1.

Long Middles.—*Rib in, blade out. The rib must not be cut through, but merely scratched with a saw and cracked.*

Fig. 2.

Short Middles. *Rib in. The ribs to be scratched and cracked the same as long middles.*

Fig. 4.

Ham.—*Short cut.*

Fig. 3.

Ham.—*Long cut.*

HORTICULTURE AND POMOLOGY.

Considerable interest has been awakened within the last few years in favor of fruit-culture and horticulture in general, through the agency of societies, magazines, and books designed to improve both the gardens and the orchards of the United States. From the numerous pomological and horticultural associations now in active operation, and especially from the "American Pomological Congress," as organized in the city of New York in October, 1849, much practical and truly useful information may reasonably be expected. At no distant day the cultivation and consumption of good fruits in this country will reach a figure far above what is now generally expected. It is a mistake to suppose that annuals like cereals, furnish the cheapest food for man. Although bread and meat will never be dispensed with, yet a much larger portion of apples and other fruits, when grown in the most economical manner, will be consumed by the millions, because these luxuries can be increased indefinitely, and sold low without an entire loss of profit. When tested near its utmost capacity, an acre of ground in most of the States can hardly yield more of human sustenance in any other crop than in one of apples.

In climates well adapted to figs and grapes, an acre can be made to produce an immense amount. It is estimated that over 300 acres are planted with the vine within 12 miles of Cincinnati; nearly two-thirds of which were in bearing last year (1849), producing, notwithstanding the rot, from 50,000 to 60,000 gallons of wine. Mr. R. Buchanan says: "Some vineyards in good seasons have produced at the rate of 600 to 800 gallons per acre. A bushel of grapes will, if well ripened, yield 3½ to 4 gallons of wine." The Catawba is the principal wine-grape cultivated in that vicinity. The American Pomological Congress holds its next session in Cincinnati, commencing on the 11th September, when it is understood that the Ohio State Agricultural Society will hold its annual fair and cattle-show.

We have received a pamphlet of 60 pages, containing the proceedings of the North American Pomological Convention held at Syracuse, N. Y., Sept. 14th, 1849. From this we make several extracts, and should gladly copy more, did the limits of this Report permit. This society has been united with and merged in the Pomological Congress, at the head of which is the excellent and distinguished Marshall P. Wilder, of Massachusetts, long known as the President of the Massachusetts Horticultural Society.

Those wishing to keep up with the rapid progress of pomological and horticultural science should take either "The Horticulturist," edited by A. J. Downing, author of "Landscape Gardening, "Fruits and Fruit-trees of America," and other standard works, or "The Magazine of Horticulture," edited by C. M. Hovey, of Boston, a standard work, which has reached its sixteenth volume.

Periodicals devoted to the collection and dissemination of useful knowledge in the several arts and sciences which pertain to agriculture, fruit, and horticulture, are rendering the country a service of great and enduring value.

REPORT OF THE COMMITTEE

OF THE NORTH AMERICAN POMOLOGICAL CONVENTION FOR THE STATE OF ILLINOIS.

(From the "Proceedings of the N. A. Pomological Convention.")

Gentlemen of the Convention:—Your committee for the State of Illinois has directed me to report personally, as it has been found impracticable for us to meet in session. I would observe, however, that I have seen all the members (with one exception), and have corresponded freely with them, and with many of our professional brethren in northern and middle Illinois. But I am sorry to be obliged to add, that I have obtained no reliable information from the southern portion of our State, and which, I fear, has in more ways than one, established an indubitable right to the local synonym of "*Lower Egypt.*"

It should be borne in mind that our State extends through more than five degrees of latitude; and that the general aspect and character of the country, though somewhat diversified, is very unlike any of the older States. Its great and distinguishing, or generic features, are its *prairies.* They extend with few interruptions from Lake Michigan to the Mississippi, west and south, and are the principal lands devoted to cultivation in the State of Illinois.

We have no mountains, and few elevations of sensible note. We are in the habit when speaking of our lands, of dividing them in the first place, into "timber and prairie lands." The timbered lands are again known as "river bottoms," "groves," "burr-oak openings," and "barrens." The prairies are known as "wet" and "dry"—or high and low—and "level" or "rolling" prairies.

The river bottoms are often composed of deep alluvial deposits and rich natural soils, left from the subsidence of the waters, when our great lakes abandoned their southern outlet; and perhaps annual additions from floods, and from the vegetable accretions of unknown years since that event. But much of the timber lands near the streams are of a different and less desirable order, ranging from those which produce the burr-oak, hickory, butternut, black-walnut, and bass-wood, to those covered with the white and black oak. The former of these are always good; the latter generally poor, and often barren, and worthless for agricultural purposes.

It is worthy of note that timber is always found on the easterly side of the streams in the prairie country; and where you find natural timber, there you will find water more or less permanent and abundant.

The "groves" or "islands," as they are fancifully called by the old squatters, are scattered over the whole face of the country, and are the only *landmarks,* and the most beautiful feature of prairie land, as God made it. The groves are in size from the solitary cluster of trees that you might count in a breath up to those of miles in extent, and furnishing fire-wood and fencing for hundreds of prairie farms.

The soil of the groves is, in general, better than that near the lakes and streams, (the alluvion excepted), partaking more of the nature of the surrounding prairie.

Burr-oak openings are intermediate in their characters. They are found in detached groves, or at the skirts of the heavy timber of the water-courses and basins. The burr-oak soil is always good, and often excellent. "Barrens" are found everywhere: some are sandy, others clay; they are fortunately of small extent, though of frequent occurence, in the timber region. The sandy barrens produce well when highly manured; the clay is avoided by all cultivators of American origin.

The best, and, fortunately for agricultural purposes, the largest sample of wet prairie, is to be found at and near the lake end of the Illinois and Michigan Canal, along the ancient outlet of the lake, in the vicinity of Chicago. Much of this prairie, where underlaid with sand or gravel, is easily drained, and makes good land, though apt to suffer from drouth. That over clay, with a very deep and peaty soil, is liable to the same objection; but after thorough ploughings, it is more retentive of moisture, and produces constant and most abundant crops.

Many small tracts, known as "wet prairie" fifteen years ago, and rejected by the first settlers, have become dry by being annually mown and fed down by domestic animals, without other than its natural drainage, and exposure to the sun and air by the destruction of the impervious screen of tall "slough grass."

The "dry prairies" are generally very similar in appearance, so far as surface is concerned. Small portions of "level prairie" are found everywhere, but to constitute dry prairie it must be "rolling." Between the waves on this great ocean of God's own beautiful sod are the "sloughs," the terror of the early emigrant, and the most valued possession of his successor; as often affording water, and always an unfailing and most luxuriant natural meadow. These sloughs are the drains of the dry prairie. They are in general nearly parallel, and oftenest at about a right angle with the course of the rivers; they are from 40 to 160 rods asunder, and sometimes of many miles in length. The soil of the dry prairie is from 12 to 18 inches deep in this region; the wet prairie, in general, much deeper; and the alluvion, as in all countries, of irregular and often astonishing depth.

Soils, Subsoils, Manures, &c.—C. R. Overman, pomologist, of Canton, Ill., writes me:—"The natural soil of our county is evidently an alluvial deposit, abounding more or less with lime; that of the prairies is a rich, black loam, on an average two feet in depth, with a trace of fine sand. In the timbered lands, a strong clay soil of less depth generally predominates, though in some places it is a deep, rich, friable loam, similar to that of the river bottoms."

Mr. E. Harkness writes:—"My locality is 20 miles west from Peoria, lat. 40 deg. 30 min., on the table lands, elevated about 250 feet from the Illinois river. The soil is a rich, dry mould, resting upon a bed of yellow clay, slightly mixed with fine sand. I have found the roots of young apple trees, not more than four inches in diameter, which had penetrated *four feet* downwards into the clay, and ten feet from the collar of the tree—so that this may be regarded as permeable to the roots of trees," &c. &c.

M. L. Dunlap writes:—"The whole country north of the 'coal region' appears to be underlaid with lime rock, of various qualities, of unequal strata and irregular dip. It occasionally crops out, and furnishes an excellent caustic lime for building and agricultural purposes, while in some places it is magnesian, and highly charged with sulphate of iron."

That the surface is everywhere "highly impregnated with salts of iron," says Mr. Dunlap, "is easily shown by driving a green oak stake into it, and letting it remain a few weeks, when it will be found that the iron has united with the tannic acid of the oak, and given it a fine blue-black color."

There is a great abundance of lime in our subsoil everywhere through this region, and I doubt not, iron and potash in a liberal proportion. But as I have specimens of soil and subsoil now in process of analysis by Professor Blaney, of Rush Medical College, I shall await his report, hoping to append it to this paper in season for publication. Professor Blaney's analyses have been interrupted by the prevailing epidemic in Chicago. But it will come in good time, and will be scientific and reliable.*

I will merely say that probably nine-tenths of this region has a *clay subsoil*; the balance, sand and gravel. The white clay is of various depths; I have found it from 15 to 25 feet, and then blue clay to the depth of 40 feet; after that, quick-sand, above the limestone. Our soil is generally very dark colored; in fact, black, from carbon, probably. The soil becomes lighter colored by cultivation, and as our English neighbors say, "sadder," and then it requires manure, and manure is at all times *useful*, in no country more so, though not always *necessary*. We are not in the habit of saving or using our manures with much care; further south, the cattle-yard is removed instead of the manure heap.

For fruit trees, especially the apple and quince, I have found barnyard manure, half-decayed chips, charcoal, and ashes, serviceable, and so says Mr. Miller. Many seem to think that the annual burning of the prairies furnishes potash. They forget that this potash comes from the soil, to which it is returned in a free state, and immediately taken up again. The combustion probably furnishes most of the carbon in the surface soil, and this is taken from the atmosphere. The soil is generally blackest where deepest; and driest, where the subsoil is sand or gravel, or as clay or sand predominates in the surface. Generally, that soil which contains the least undecomposed vegetable fibre suffers the least from drouth, and vice versa. But deep and constant cultivation, and judicious drainage, soon equalize and regulate evaporation, infiltration, and absorption, on most of our lands over clay; and judicious manuring, and occasional "seeding down," will keep them good, though they will gradually lose their dark color in the process, and doubtless much of their natural fertility.

Few orchards receive much manure, and it is highly probable that more trees (taking all sorts) are injured than benefited thereby, in our rich prairie country. Mr. L. Montague writes Anson S. Miller thus: "I will here remark that there is not one foot of land in Illinois that requires manure for fruit trees, other than ashes and lime, and old compost," &c. "Peaches, plums, and cherries should never taste manure."

Climate.—The climate of Illinois is extremely variable. Our winters, though comparatively short, are very cold, and we have, in general, little snow to protect plants at and above the surface of the earth. The ground some seasons freezes deeply; others, not at all, except in exposed situations. Our winter is often a double one; a "cold snap" in December, mild in January, and then cold again in February. The changes in temperature are sudden and violent, and fruit trees suffer therefrom in various ways. We cannot plant in autumn with any degree of safety, as the constant

* See "Analysis of Prairie Soils," page 488.

freezing and thawing of the ground throws the plant from its bed, unless artificially protected by a deep covering of litter or a mound of earth, and then, the shock that the *vital principle* receives from their removal renders them less able to withstand the effects of our sudden and violent alternations of heat and cold, and a liability to disease, or actual death, is the result.

In this corner of the State, the influence of the great lakes is beneficially felt during fall and winter, and reversely in spring and early summer. Our coldest winter winds are from the west, and those of spring and summer from the north and east.

As you go south, the climate, though still variable, is much milder, until at its southern extremity we find it as propitious as that of some of the Southern States; the cotton-plant maturing a partial crop, and the indigenous cane, though dwarfish, surviving the winters. I have received no figures from the south, and cannot therefore give the range of the thermometer from below our lake region. But the report from Missouri will doubtless supply the deficiency.

I regret having to say that I have kept no register, and that the figures furnished me by my friends in northern Illinois are so widely different, that I am inclined to believe that some of their instruments must be imperfect. I merely state that the range, as given me (for 1849) by men of science and observation, is from 30 deg. *below* to 102 deg. *above* zero, in the shade. I will give a few figures from the most reliable sources only:—

1849. For Chicago, by Prof. Blaney, coldest day, 15 deg. below 0.
Near the Grove, by M. L. Dunlap, coldest day, 16 deg. below 0.
1848. At Elgin, by Mr. Truesdell, December 7th, 16 deg. below 0.
1849. At Elgin, by Mr. Truesdell, Jan. 20th, coldest day, 19 deg. below 0.
1849. At Napierville, by Mr. Ellsworth, 20 deg. below 0.
1849. Near Galena (questionable authority), 30 deg. below 0.

I have the most complete report from our member, Hon. Anson S. Miller, of Rockford, Winnebago Co., Ill., (some 50 miles northwest of the Grove,) and which may be taken as an average standard for northern Illinois.

Mr. Miller writes me, that he is indebted to Dr. Haskell, of Rockford, for his figures, and that the doctor is minutely regular and correct in his observations. I condense as follows:

1848. March: From 10 deg. to 40 deg. above zero at sunrise; but one day, (March 3d.) after the 20th Feb., 20 deg. above 0.
1848. April: Average 35 deg. above zero, at sunrise.
1848. May: " 45 " " "
1848. June: " 60 " " " Hottest day, 19th, 92° at noon.
1848. July: " 60 " " " Hottest day, 10th, 96° at noon.
1849. Coldest day, Feb. 19th, 18 deg. below zero, sunrise.
1849. Average of Jan. and Feb., 20 deg. above zero, at sunrise: warmest winter day, 48 deg. above zero: one of the coldest winters since the settlement of the country. I have no record of the quantity or depth of the snow; both were considerable, though not equal to some winters. The ground was but little frozen.

The proportion of clear, sun-shiny days, during our summer and autumn months, an average of seasons, is as more than two to one; and believed to be nearly one-third more sunshine than east of the lakes.

From the weight of testimony, and all the figures received, I am inclined to believe that the range of the thermometer for 1849 may be set down at 117 deg., or from 19 deg. below zero to 98 deg. above zero, at noon, in the shade; and where the transitions are as rapid and considerable as in this latitude, you may readily infer, that none but the hardiest trees, with wood fully matured, are at all times safe from the influence of such great and sudden changes of temperature. The past winter and the present summer furnish the most abundant and discouraging proofs of the fact. Perhaps at least three-fourths of the peach trees were entirely or partially winter-killed, throughout this whole region. Pears have suffered very considerably, especially those which made a large growth the preceding season. Plums have been injured in some places, and even apples. Nectarines and apricots are mostly dead. Cherries, where but little wood was made, have withstood the winter as well as usual. But shrubbery has been badly cut down: nearly all the hardy June roses killed to the snow, and even lilacs dead, "root and branch."

Our summer has been a cold one, a few hot days to the contrary nevertheless, and the early growth in the orchard and nursery has not been large; and the occasional very hot days, or some other malignant influences, have seared and blighted the early foliage as with fire. Nearly all the fruits, the locust and some hardy forest trees even, have shown more or less of this partially scorched appearance in the June and July leaves, though the growth at this time (August 30) is good and the foliage healthy.

But notwithstanding all these grave disasters and natural drawbacks, it will be seen that Illinois is bound to be perhaps the greatest fruit country in the world. Labor is dear, and trees have heretofore been difficult to procure. Still we have persevered, and shall continue to plant trees, until the bleak and naked prairie swells shall become a rich and varied landscape of dotted fruit groves, gemmed and glowing with Pomona's ruddy treasures, drawn from the well-wrought mine below, the ardent sun, and the free air above, which shall then come to all with

"The breath of orchards big with bending fruits;"

with health in its breezy sigh, and luscious promise in its grateful odors, more delicious than the "perfumes of the East," and more healthful than all the nostrums from the days of Hippocrates down to this, par excellence, *the age of patent medicines.*

It is nearly 200 years since the first settlement of this State by the French, at Kaskaskia and Kahakia; and yet I have no certain evidence that there is a fruit tree of a cultivated variety, 40 years old in Illinois, and I am well assured that there are but very few of even half that age.

There were a few squatters in northern Illinois, possibly a dozen or more families, at the time of the Black Hawk War, in 1832. But as the Indian title was not extinguished until the spring of '35, no permanent settlement was commenced until the summer and autumn of that year, so that in reality the country is but from 14 to 15 years old, counting from the date of the first considerable immigration. When I first visited this region, only fifteen years ago, there were not ten families where there are ten thousand now; and I did not see a fruit tree, or even so much as a currant bush, this side of the present capital of the state, though I was told that there were some seedling trees near Peoria; and afterwards I saw apple trees near the garrison ground, Chicago, planted by General Beaubian, while Chicago was our remote trading post; and there were also a few trees set by Doctor Harmon,

probably about 1833 or 1834; but, except some worthless Morello cherries, these have all disappeared.

The first occupants here were mostly of the true squatter breed—genuine frontier's men—that, like "the white man's fly," the honey-bee, always precede the actual settler—so that no attention was paid to orcharding; and in truth few cared much about planting trees until we could be tolerably certain we were planting upon our own lands; and of this we had no evidence until after the surveys, and no security until after the land sales. The last of these events occurred only about eight years ago; and the former, the year before. From this èra we date the commencement of fruit culture in northern Illinois, though for some years thereafter we were all poor, having been drained by our land purchases, and more especially by the $\frac{10}{100}$ to "cent per cent." per annum, which we had to pay those who kindly loaned us a good share of the money.

Now, let us see what has been done in these nine years at most. I am a son of New York, and love my native State; and yet I declare, without fear of contradiction, that we in northern Illinois have done more to create good orchards in the last nine years than you had done, "west of Cayuga Bridge" up to the date of our commencement. Go where you will over these broad prairies, which fifteen years ago were the homes of the "Red man," and were tenanted only (except along the streams) by the wolf and the badger, the prairie-chicken and sand-hill crane, and you will find orchards and gardens, not equal, of course, to yours *now*, but *better* than the majority of yours nine years ago; not larger, for you have many orchards of large seedling trees—or had then; I see you are working at the tops of some of them now, and for this you deserve much credit. But we are doing better still. We are planting the best known sorts, and we are planting them liberally, and they will liberally—ay, abundantly repay the care and expense. The best evidence of what an insular region may be doing in the way of planting orchards, with the certainty of ample profits, should be sought in the number and extent of her nurseries, and the number of trees imported from abroad; but of this in its place.

We have some seedling orchards from 10 to 15 years old; further south they are more numerous, as well as older. It is generally remarked—and with truth—that our seedlings are better than the same class in the Eastern States. Soil and climate have doubtless much, if not most, to do with this fact; still I am led to believe, despite the Van Mons' theory, that the selection of seeds may have had its influence. We reason from analogy, and are apt to believe that like should produce like. We know that the rule does not hold good with regard to fruits; still we follow it—at least here, and we have seen some astonishingly favorable results. I will state an instance. My brother, H. Kennicott, purchased a part of his farm from a man who had a peach orchard on it, from the pits of "Hoosier peaches," to wit: small, worthless, late varieties, principally cling-stones. These trees have borne five or six years, and have withstood the last hard winter. I have annually seen and tasted the fruit, for they produce abundantly,—and they are actually worthless, except for seeds. Illinois hogs would not eat them, and they are all alike, and like their originals. Now for the reverse. Another neighbor, while East some years ago, ate a few good early peaches, probably Barnard's early. He planted the seeds—about a dozen; they grew, and have borne six or seven years—two of the crops very large—and sold readily at $3.50 to $4 per bushel. Of these I have eaten annually; they are large, and all good and early, and all alike,—and, as the others, like their progenitor as nearly as the person can recollect. These, of course, are extreme cases; still I think they will find their parallels in all parts of the State; and I have certainly tasted *ten* passing good seedling apples here, where I have *one* in New York; and from my position I have the tasting of many.

There is, a few miles from the Grove, quite an orchard of seedling pears, 14 years from seed planted here. All are bearing, and, what is curious, are bearing abundantly this year; the only ones I have seen. These trees came into bearing from the 9th to the 12th year, and the fruit is said to be good, though I do not remember having eaten of it.

The most of trees planted in northern Illinois, until within the last five or six years, were either home-grown seedlings, or "Hoosier trees," generally from the region of the Wabash, though some came from southern Illinois. These are often seedlings or sprouts, though sold "under name" by the tree pedlars. These trees have made a famous growth, but they show very little fruit; and when evidently worked, are too often found no better than our own seedlings. Indeed, my neighbor Mr. Talcott has quite a number of size to produce 16 to 20 bushels of fruit each; and I do not believe they have borne one bushel each, all counted, since they were planted, 14 years ago; and what is somewhat characteristic of "Hoosier trees"—or pedlar's trees—they are all of the same worthless, if not nameless variety. But for their lack of fruitfulness I cannot account—it being a general complaint urged against southern trees in northern Illinois. I have thought that this might be owing to the fact that most of these early trees were worked on sprouts, or small portions of the root of large seedlings; but it is more likely that the change of climate is the cause of this unfruitfulness, joined to their astonishingly rapid and uninterrupted growth. Most trees brought from the north and east have come early into bearing, and have not made wood with great rapidity.

Of Nurseries.—There is no part of the world better supplied with nurseries than Illinois, though few of them in the north are as yet fairly operating "on their own bottom"—most of them being either connected with, or purchasing largely of Ohio and New York nursery-men. As I am somewhat deeply interested in the business, I have taken great pains to come at the nursery statistics of the north-west. I have visited many of the nurseries, in fact most of the larger ones, and I believe that there are now, either partially operating, or about to operate, or in some stage of actual inception, not less than 50 establishments, within a space of from 50 to 60 miles north, west, and south of The Grove, Lake Michigan being on the east. Twelve of these nurseries are in this county, and most of the others within 25 miles of me, "as the crow flies."

Of the nurseries in this county, I can say from personal inspection, that at least five of them are quite respectable; and though I am not positively certain, containing, I should judge, from 30,000 to 80,000 trees, not including young seedlings, of which one nursery has perhaps over 10,000, and all have more or less. And in addition to fruit trees, the most of us are well supplied with ornamental trees, shrubs, and plants, of which some of us have certainly as great a variety as most Eastern nursery-men.

Of the nurseries in Kane Co. (one of our best and richest interior counties, by the way), I will let Mr. Truesdell, of Elgin, speak. He says, in a late letter: "Six nurseries are already established in our county, setting annually 100,000 grafts or more. How much budding is done, I know not.

I intend setting this summer about 30,000, &c. North, west, and south, nurseries are established, or being commenced, in nearly the same ratio. So that, with what our Eastern brethren are doing for us, and the 'right smart chance' of southern trees annually peddled through the country, it will come to pass, one of these years, that fruit trees and ornamental shrubs will be about as plenty on the prairies as burr-oaks and hazel brush are on the barrens." Mr. T. is wrong there: "burr-oaks and hazel brush" do not flourish "on the barrens." It is always comparatively good land where they predominate.

Mr. Harkness, of Peoria, writes me, of recent date: "Our operations in starting young stock this season have been very successful. We have started 31,000 root grafts; 80,000 young seedlings for budding; 40,000 stocks for grafting; about 200,000 Virginia thorn plants; and 350,000 wild orange plants—all of which look remarkably well."

There are many large nurseries in Mr. Harkness's vicinity, and through the entire central portion of the State. One nursery-man, not two degrees south of us, sold the past season, as I have been informed (though it needs confirmation), not less than 20,000 apple trees under name. John Slater, of St. Albans, writes me that he sold 13,000 the last spring, and the season was bad and competition active. Mr. S. propagates all except peaches, nectarines, &c. by *layers*, which root and are fit for planting in about 3 or 4 years. The best are then sold, and the balance set in rows in the nursery and relayed. He sells at $40 per 1000, or 6¼ cents each, "all around," apples, pears, plums, shrubbery, &c. Not much chance for successful competition there, if his trees are, as he asserts, better rooted, larger, finer, healthier, and earlier, and better bearers, than worked trees of the same varieties.

All the nursery-men through northern and middle Illinois with whom I have communicated, as well as those in southern Wisconsin, (our own neighborhood,)—where roads were impassable alone excepted—write me that they have "sold bare," and that the business promises well: still, I fear that some of us must "wind up," or do worse. It strikes me that we are, at least about here, as they say South, "running the thing into the ground;" and yet this one fact speaks volumes for the good taste and intelligence of our inhabitants, and the adaptation of our soil and climate to the cultivation of fruits.

Nursery-men are, I believe, always intelligent men, and should be shrewd observers, though I fear we are not all good "business men." Our *bumps* of benevolence grow with our trees, and we are very apt to think we are benefiting ourselves when we are doing good to others. Our "hope is large"—our fruition small. We create the plant; others eat the fruit, or enjoy the profits. But the practice of our beneficent profession humanizes us, and simplifies and refines our tastes, and makes us better and happier, if not richer and wiser men. Why then should we not be satisfied with our share of the good we create?

The price of nursery trees varies much in different portions of our State: from Mr. Slater's tariff of charges, viz: "Sixpence a tree for all sorts, and two trees given for every twenty purchased;" up to our own rates, which are substantially the same as in western New York; though pears and plums, and choice cherries (which are imported), have sold at from 50 cents to $1.00 each, according to size, and not often in reference to scarcity of variety, or the popular demand. Apples and peaches only are abundant with

us; other fruits are never found equal to the demand. South of Joliet the ruling rates are lower than ours—say about 12½ cents each for apples and peaches, and about 25 cents for pears, plums, and cherries, when of choice sorts; but, as here, these latter are not abundant, and their varieties are limited.

In the north our catalogues are based upon those of New York and Ohio, though some of us have many southern names unknown to you, and, I fear, some worthless fruit; I have seen near fifty synonyms given as *varieties* in one catalogue, the *true* name being there also; and I have counted forty-seven *new names* in a southern catalogue. Nursery-men, as well as orchardists south, complain that they have received many trees not *true* to name, some of them from Eastern establishments. Our lists need purging, and some of our orchards, like Mr. Allen's pears, may need reworking. Still, we think that we are not worse off in this particular than you of western New York.

The Apple.—Here, as elsewhere, north of 36° the apple is the principal fruit. We have tested, or are now testing, all the varieties of western New York and Ohio, and some of our nursery-men have introduced the most approved of the southern Illinois and Indiana varieties. Mr. Overman, of Canton, Ill., sent me a box of their early local sorts, and I am compelled to acknowledge that, to my taste, the apples sent me were fully second-rate, and at least as good (I think much better) as some now generally cultivated as the Oslin, Hawthornden, &c.; and they are set down as free growers, early and abundant bearers, &c.; and it is more than probable that some of these sorts are worthy of general cultivation in the West.

I shall not attempt to describe these local sorts: 1st, because I have seen very little of them; 2d, because I hope to be able to present the later ones with this paper to the Convention; and 3d, I shrewdly suspect that some of them will prove to be old varieties under new names, though most of those sent me by Mr. Overman are known western seedlings.

We have fruited about fifty sorts under name here at The Grove, and some of my friends have fruited more. Ours that have come into bearing are not all true to name; but are mostly so. Some varieties that are said to bear well at the East are miserably unproductive here. The Oslin, Harrison (worthless any way), Newtown pippin, Roxbury russet, &c. &c.; and I am afraid that the universal Rhode Island greening will prove a shy bearer, though the specimens we have had are all very large and fair. The Spy, Spitzenburgs, &c., have not yet fruited with me; neither has the Baldwin, and this, also, is much distrusted with us. From all parts I hear complaints of some of these varieties, the Newtown pippin particularly, as unfitted for a hot and dry climate; and the Rhode Island greening, and Roxbury russet, as cracking at the collar of the nursery-tree, and as shy bearers in the orchard. All that have fruited it speak highly of Rawle's Janette as the apple for Illinois; and say that the white and yellow Bellefleur are "perfectly at home" on our rich prairie soils. Most southern men speak of "Limber Twig" in terms of great praise. It is said that the Carthouse, or "Red Romanite" of the south, is one of the most profitable market varieties, from one end of the Mississippi to the other. Here, of all keeping apples, the Poughkeepsie, or Winter russet, has produced the largest crops.

Of Autumn Apples.—The Rambo receives the most praise farther south. Here, all the varieties that have come into bearing appear to be as good, or better, than at the East; and with the exception of the Oslin, the summer

fruits are all at home here. The Yellow harvest is rather a shy bearer as yet, but the fruit is large, generally fair, and most excellent; and we hope that older trees may produce better crops. Of all early fruits, that not over-good sort, the Keswick codlin, is the most early, uniform, and enormous bearer. With regard to season of maturity, I am fully persuaded that *early fruits*, if differing at all, are rather *later* here in the Lake region, than in the same latitude near the seaboard; and that most *winter fruits* mature earlier than at the East. In the former I may be mistaken, as my opportunities for observation have not been great; and trees, when they come into bearing, are apt to be a little anomalous in their fructification. I account for the fact by the character of our late spring and early summer weather, which is comparatively cold near the Lake, and generally wet; while our midsummers and autumns are hot and dry—the sun acting fiercely upon foliage and fruit, while the previous condition retards those of earlier habits. In the southern part of the State winter apples are very liable to the *black-rot*, spots, &c.; but I have seen very little of this here.

Insects.—The borer is rather troublesome near the timber in all parts of our State. He is native, and is found in the thorn and many other native trees. I have seldom seen the marks of this insect nearer than 18 inches above the ground; and have *never* seen him "at or near the collar of the tree." Ours may be a different species. We find from one to four in each mark, generally two or three. He never enters the wood until the second year, and I think comes out during the third and fourth summers. The borer is not plentiful except near the timber. We always endeavor to cut him out before he has time to bury himself in the wood. He is easily destroyed.

We have a few canker-worms, imported ones I think, as I have never noticed them except on imported trees. We have an abundance of the small native caterpillar; and I have seen a few nests of the large ones on imported trees. The *bark-louse* is found on most Eastern trees, especially those that produce inordinate crops of fruit. I have not observed this insect on thrifty native trees. The green *aphides* are very troublesome. Last year these pests checked the mid-summer growth of seedling apples, so as to make budding impracticable. I have seen none to speak of this year, except on my tender roses.

Some years ago, apples here and south were worked on sprouts and sections of the roots at large—and often, old seedlings—now, on the entire young seedling plant. There is much more budding than grafting done, at least in northern Illinois. Nursery trees south, and in the middle of the State, make an astonishing growth. Here, the early growth is but little better than in New York, though the late growth is sometimes dangerously rapid and luxuriant, causing the bark to burst in winter, and subjecting them to the risk of winter-killing altogether.

In speaking of the "Fulton Apple," one of the best Illinois seedlings, Mr. Harkness says he measured the original tree (in the orchard of Elijah Capps, Esq., near Canton) when 19 years old, and it gave 36½ inches in circumference 3 feet from the ground; 28 feet across the top, and 25 feet high. It had borne large crops for ten years in succession. The same gentleman says, in a letter just received: "I can now take at least ten bushels of fruit from trees, which in the spring of 1840 were mere switches, and have produced their entire heads since that time."

We commenced our orchard eight years ago last May. We had a few seedlings before, and my brother some Hoosier trees planted out in 1835, (which, by the way, have never borne much,) and we had from a Keswick Codlin six bushels of apples the sixth year, and about the same quantity of Poughkeepsie russet. We purchased our trees of Col. B. Hodge, of Buffalo, and they were of the ordinary nursery sizes. Some of these trees have borne every year since the second after planting. Those that never fail are the Keswick Codlin, Summer Rambo, Hawthornden, pound sweeting, Sapson, black apple, &c. These instances are sufficient to show the productiveness of the apple tree in Illinois. In planting our orchard trees, we dug holes 4 or 5 feet across, and 18 inches deep at least; we mixed in a little manure and refilled the holes, planting near the surface, so as to cover the roots in their natural position, and within the influences of light, heat, air, and moisture. We keep the ground in good condition as to cultivation and manure, wash the trees with soft-soap and water, and destroy most of the insects, &c.; but otherwise leave them to nature, no "hand-saw" or "jack-knife" ever mutilating their luxuriant and beautiful heads.

Pears.—Few pear trees were planted in Illinois, until the last three or four years. Those that have shown fruit promise very well. My white Doyennes the last year were truly delicious. One tree, but seven years from the nursery, produced nearly a bushel of large, perfectly fair, and very excellent fruit, and it bore perhaps a peck or more the preceding season. A Stevens' Genesee, Easter Buerre, and a few others of doubtful names, have borne well, and except one, which I take to be an "M. Jean," were good. My dwarfs have not yet fruited, but in Chicago some have produced well, especially a Bartlett, in the garden of J. Y. Scammon, Esq.

Pears are apt to make too much wood here, late in the summer. Many of mine, in the orchard that had made great growth, were winter-killed down to the snow; the trunk being black and dead, the branches green, and the foliage opening well, when they were discovered and amputated below the line of demarcation, and a few of them have sent up a fine shoot from above the bud.

I have twice seen what I presume to be "frozen sap blight," consequent on late growth. I carefully removed the diseased bark in May, and covered the wound. All the trees recovered, and two of them have borne fruit. I think the affection is not uncommon here, but may in general be avoided.

I have never seen what is known as "insect-blight," or "fire-blight," or, par excellence, "pear tree blight," though the affection is said to be well known far south of us, and possibly west, near the Mississippi. A letter from R. Montague, addressed to Mr. Miller, would seem to favor this idea. Mr. Montague says, that "of ninety-six pears in my orchard, all are dead, or dying from blight." He is in latitude 42 deg. 30 min., and says that many of his "apple trees are dead from the cold last winter." I therefore conclude that his pears are *winter-killed*, not *blighted*. But I will not dwell on this opprobrium of our science now; suffice it to say, that I believe we are in the habit of confounding several distinct diseases, of different origin, and requiring different treatment both preventive and curative, under the dreaded name of "blight." The one disease, or phase of the disease, most deprecated, may be "epidemical," like the potato rot and the cholera, and may possibly, like these, disappear, to return again after an interval (God send it be a long one); or it may be "endemical," and find its origin in a deficiency of some necessary principle, or in the excess of some noxious one, entirely local. The remedy will yet be discovered. We cannot consent to

risk even the partial abandonment of the most popular and delicious fruit in the catalogue; and we are approximating so near to a reasonable certainty in agricultural, and especially horticultural science, that we shall for very shame be compelled to investigate and determine this vexed question.

During the last summer our seedling pears were for the first time badly affected with "leaf-blight." We received them from the East, and they had suffered from the disease there. This summer our own seedlings, as well as some healthy ones from Canada, lost their foliage from the 20th July to the 10th of August. A few put out new terminal leaves, but the most of them are now (September 1st) entirely naked. Can this disease be contagious? I should think not; and yet this has a sensible leaning that way. The soil on which our seeds were planted was worked two feet deep and was sufficiently moist. We syringed with solutions of sulphate of iron, but without benefit.

Pear trees of choice varieties are in great demand in our State, and will soon be abundant if we can rear stocks. A few avaricious or ignorant nursery-men have used *sprouts*, or, worse still, the *apple*, as stocks, to the evident damage of their reputation, and the great disappointment of many who deserved better treatment at the hands of nursery-men. But there are quacks in all professions, and true men sometimes humbug themselves, and very innocently cheat their best customers.

But, gentlemen, for the eradication of all false notions and the prevention of error, we look to you and the action of national fruit conventions. We are all a very little given to credulity, and we *must* believe each other. A book before the eye was never yet equal to "the subject" in hand, or under the dissecting knife of the operator.

The Peach.—Next to the apple, the peach, from the ease with which it is produced from the seed, and its early fruitfulness, has been most extensively cultivated throughout the West. Few, however, are found in our markets except seedlings, and some seasons these have been abundant and really excellent, and yet have never sold, so far as I know, for less than \$1.50 to \$2.50 per bushel in the orchard, and often at from \$3.50 to \$4.00 when taken to market. Mr. Schenck (eighteen miles from The Grove) has had four or five crops in the last nine years, *two* of them very large. One year (1847 ?) it was in proof in court, that the value of \$2000 was sold from this orchard; and several others in this region have sold from \$500 to \$1000 worth in a season.

I think that about here we get one full crop in three years, on an average; and perhaps always a few specimens in the intermediate years. Further south and in the middle of the State, they do much better—say three crops in five years.

And yet, were it not that the peach bears young—sometimes the second, and often the third year—we should be discouraged; for from much observation I conclude that the average age of the peach heretofore has not been over six or seven years in northern Illinois: not dying from premature old age, but, like the cherry, from the effect of our soil and climate, and naturally faulty cultivation. Of perhaps one hundred trees planted in my orchard between 1836 and 1845, but *one*, and that my *oldest seedling*, is now alive; all my worked ones dead, over three years from bud, and at least half of the younger ones. The last winter was very hard on the peach; nearly all those "in the bud" were killed in some nurseries, and few of any age escaped where cultivation had been high, or the lands deep and rich. Ours that survived were all on our poorest and driest soil, and with a northern or western aspect, and received *judicious* cultivation.

The peach will not bear liberal culture here, and will not long survive if sparsely planted on a black, deep soil, with a *southern* exposure. We now select the highest elevations and the least sunny aspect, and plant but eight feet apart, "in quincunx," raise a crop of early potatoes, perhaps, the first year, and then no crop but peaches. A neighbor, whose peach orchard is on a high white oak "clay barren," not cultivated, has always had some fine fruit, and lost very few trees last winter.

I have found but *one* "peach grub" in my native trees. We find a few in imported trees, which we are very careful to destroy. I have heard of a few doubtful cases of "yellows" far south. The "curl" of the leaf is very common in June. Our worst affection is the "gum." This I think is something like "frozen sap blight" in the pear,—a sort of *gangrene*, or rather *erysipelas*, caused by sudden alternations of cold and heat, acting upon a too luxuriant and immature growth. We usually pare out the gangrenous bark, and cover the wound with clay or wax; but they generally die in a year or two at most, when badly affected.

We now cultivate our peach trees (after the first year) during the spring and first summer month only, and give them a northern or western aspect when practicable. Trees thus situated live thrice as long as those receiving a reverse treatment. We prune but little—merely "shortening in" occasionally, and removing dead wood. The varieties cultivated are the same as those in Ohio and western New York, though a few native sorts of promise have been introduced.

The Plum.—The plum tree succeeds to admiration on our deep prairie soils, and "sets" enormous crops of fruit. But, alas! the curculio makes sad havoc, and often leaves us scarce a single unmarked specimen. Most of our best soils are light "sandy loam," and this is the proper home of this "hump-backed little Turk," where he winters unharmed, and breeds and multiplies to an extent which threatens the ultimate abandonment of this and other beautiful and delicious fruits of its class, unless a more practicable remedy than any now attempted should be discovered. The curculio, like the apple-borer, is native here, and he finds the nidus for his young in the oceans of native plums everywhere indigenous, and unfortunately everywhere preserved or introduced into fields for their cheap and tolerable fruit.

I had flattered myself that from the fact that my choice plums in the immediate vicinity of my groves of wild ones suffered most from the curculio, that this depredator was not inclined to emigration, and that our prairie orchards distant from his native home might escape his ravages. But I fear not. I have this summer seen a fine young plum orchard (near half a mile from the timber), the trees for the first time covered with swelling fruit, and, so far as I could perceive, every one bearing the crescent mark of the inevitable destroyer.

I have noticed the fact, heretofore reiterated by plum fanciers, that in our heavy clay soils the wild plum comes to perfection, while in the light soils all are dropped.

By selecting the clay soils, *paving* the light ones, and making "hog pastures" where we are to poor too pave, and shaking and hand picking when we have but few trees, *after* the destruction of the native trees we may have a sufficiency of choice plums; but, with our present knowledge, not otherwise.

My plum trees have borne since the fourth year from the nursery. The fruit is seldom injured by the frost, and one year we had a very large crop of perfect plums,—and the last season a good crop, on trees most remote from the grove of wild ones. Further south, I learn that few escape the curculio, and that its cultivation is nearly abandoned in some places.

The Black Knots.—The wild plums and cherries are often much disfigured and sometimes destroyed by this affection; and I have observed that it is beginning to attack the blue and purple sorts in the orchard. We practice excision in this disease (which is not only hereditary, but may be propagated by contact and perhaps contiguity), and we are trying the effect of arsenic and corrosive sublimate as topical applications, and as alteratives, applied in a very *dilute state* to the roots and foliage. Our experience is not enough to determine the safety or value of this treatment, and we would not advise it, except in desperate cases, until after further and more successful trial.

We do not believe that this cutaneous disease is of insect origin, though we have frequently found grubs in the warts, which had evidently entered *after* their formation. For stocks, on which to work the finer plums, we are now testing a very free-growing, native sub-variety of the Prunus Americana, with large, yellowish fruit, and rich, semi-fleshy pulp. In spite of the curculio, plum trees are in great demand here, and owing to the high rates East, importations have been insufficient. But we shall soon have a supply of our own creation.

Of Cherries.—The cherry with us has been thus far the most uncertain of all fruits extensively cultivated. The whole State is liberally supplied with varieties of the Morello and the Kentish cherry, disseminated almost entirely in the shape of suckers. These are all hardy, and make a rapid and handsome growth, but are in general unproductive and worthless.

The class of Duke cherries is comparatively hardy with us, and they are usually good bearers, and the fruit excellent. The Heart and Bigareau cherries thrive well in the nursery, bear early, and excite hopes of a rich future, which some six or eight years at most, show to be utterly illusory. The tree is sometimes to all appearance merely "winter-killed"; at another, it dies gradually during summer, from extensive ulcerations or "sloughs" of the bark, on the south and west sides of the trunk and large exposed branches; but the greater part of these trees die suddenly, during the month of June, from a malady which commences apparently in the inner bark of the trunk—branches and roots being healthy—the latter sending up healthy suckers, and the former making good scions when cut in season. The greater part of my trees have died soon after showing their first flowers in the orchard—the foliage often withering as completely and suddenly as though the tree were divided from its root. In all these cases, even when there is little external sign of disease, the inner bark will be found discolored and gangrenous—much the same as in "frozen sap blight," with which we think it identical.

We can do nothing except in the way of prevention; and I am inclined to believe that the proper preventive is the one which best enables the tree to withstand the effect of our extreme and sudden alternations of heat and cold; and to do this we must retard and equalize the growth, and protect the susceptible trunk of the growing tree. For this I have found effectual low heads, a poor, dry soil, with early cultivation, as with the peach in the nursery; and if removed to a better soil in the orchard or garden, permitting a sod to form, and merely "forking," or hoeing a small circle in the spring only.

So far as we know, nature never voluntarily puts her subjects in *corsets*, this being the civilized barbarism of *reasoning* beings; still there may be much truth in the notion, and much good sense in the practice of Professor Turner and others, who advise stripping off the tough cuticle of the cherry, or dividing it by reversed spiral incisions extending from the branches to the ground.

The Quince.—The quince is as much at home in our deep rich prairie soils as the apple. We manure highly, and give a little salt early in the spring or late in the autumn. A friend of ours has had some very large crops of the Orange quince. This tree sometimes winter-kills, and is very obnoxious to attacks of the borer.

Nectarines and Apricots.—These fruits have scarcely been proved here. We lost the most of our trees last winter. Some friends have had better luck with their trees, but the curculio stings all the fruit.

The Vine.—Native grapes are everywhere abundant and prolific through this entire region. Besides the common "frost-grape" of the East, we have some excellent native varieties, producing beautiful clusters of large rich berries. I have two or three of these varieties from near the "Calumet," but which have not yet fruited in my garden. The principal kinds cultivated here are the Isabella and Catawba. In the middle of the State they cultivate an excellent variety, called the "Rhenish," supposed to be of European origin, though doubtful, I think; for I have never seen or heard of a well-authenticated case where a strictly foreign grape has produced like this, in the open border, in this country.

Our best grapes are all *native* ones, and foreign varieties have universally failed. The Catawba grape has appeared less hardy here than the Isabella, and both are occasionally winter-killed; the crop sometimes fails from late spring frosts, or is ruined by the mildew. Farther south, this last is their chief enemy, though I have heard of plague from the rose-bug. Still, I think the grape crop nearly as sure as the apple.

Gooseberries.—The native gooseberry succeeds to admiration, and is rendered larger and finer by cultivation; but out of Chicago, I have seen very few fine gooseberries of the cultivated sort; the mildew ruining the entire crop, which always promises well until attacked by this disease. In the city of Chicago I have annually seen the largest and finest crops of perfect fruit grown in their semi-alluvial, *sandy* soil, and am told that this fruit succeeds all along the lake shore; but everywhere from the interior, I have received the most discouraging accounts of mildew. Can the lake winds make this difference? Or is it in the soil?

Raspberries do well where the land is moist, rich, and partially shaded. Unless protected, some of the sorts are apt to winter-kill. Native sorts are found; the common black producing good crops; the red, so far as I have seen, is not productive. The *blackberry* is found everywhere in the timber, and bears finely. *Whortleberries* in variety; *cranberries*, &c., are abundant and productive.

Strawberries are met with in the open prairie, along the borders of the timber, and on the edges of "sloughs" or "saggs," where the soil is deep and moist; and the fruit is often large and fine, and was formerly abundant. Cultivation, the feeding of cattle, &c., and especially untimely fires, are destroying the native fruits, and we are just beginning to experiment with cultivated varieties, and with glorious success. Very fine specimens of

many choice sorts have been shown at our June fairs in Chicago, and that market has been reasonably supplied at fair prices.

Currants are here, as everywhere else in the same latitude, hardy, and abundant and uniform bearers. I do not remember that there has ever been a failure of this useful and cheap berry. Plenty of manure, and deep and good cultivation, render all the varieties large and fine; neglect will reduce the finest sorts to a level with the poorest.

I had intended to attempt a creditable report from our young and beautiful Prairie State, but I have delayed it for promised information until the "sickly season" is upon us, and I have written by snatches, when fatigued in body and mind by my hard duties of a "country doctor." I have had neither time nor inclination to select my words, or to arrange or revise my matter. My facts I believe to be, in the main, truthful, and the matter must go as it is, hoping that another year may be more prolific in statistics, and that my successors may have more ability and more leisure; more love for the subject, more enthusiasm, few can possess.

Before closing this paper, I must be indulged in a few remarks on a particular "hobby" of mine, viz:—

THE PROPHYLACTIC AND CURATIVE PROPERTIES OF RIPE FRUIT.

It has long been known to a few observing men, and now and then a writer has glanced at the fact, that fruits in season possess remedial virtues. Ripe grapes have cured epidemic dysentery. In vine countries they speak familiarly of the "grape cure." Physicians have occasionally ventured to recommend the use of "cooling acid fruits;" and the earliest writers have directed the sugary ones, as figs, for food in convalescence. But it is known to all, that many are prejudiced against fruits, and consider them as very *questionable luxuries* at the best. And it must be admitted that they have often proved mischievous, especially when immature, and taken by stealth, or in too large quantities when but occasionally accessible.

Thus, in ninety-nine cases in every hundred, it will be found that the *abuse*, and not the free use of fruits, has produced the mischief. Good fruits are always grateful even to the sickly or palled appetite; and in the young and the healthy, its promising appearance or its delicious aroma often excites the most ungovernable appetite, and they gorge themselves, and they suffer therefrom, no worse than from a surfeit of fish, flesh, or vegetables, perhaps, but still enough to aid in perpetuating the vulgar error that the unrestricted use of fruit is dangerous. Who ever heard of children or men who provide seasonable fruits in abundance, and permit their habitual use, eating too much, or becoming sick therefrom? I never did. I have had a little experience in this matter, and I have taken pains to collect information, and I *know* that the families where fruit is most plentiful and good, and most highly prized as an article of *daily food*, are the most free from disease of all kinds, and more especially from *fevers* and *bowel complaints*.

I have theories to account for this; but I love not theorizing, and will not inflict my crude notions on you at this time. I merely state the grave facts, and defy contradiction. I may add, however, that some fruits aid digestion, some directly, some indirectly, by restraining the appetite for more gross and stimulating food and condiments, by keeping the "bowels soluble," in

other words, acting as mild laxatives, &c. &c. The juicy ones act as "diluents," and all as "diuretics," the free acids neutralizing or rendering soluble the earthy matters in the blood, and carrying them off rapidly through the natural channels.

All this you can understand and appreciate. But let us glance at another phase of this universal remedy. It is the best, the cheapest, and the least exceptionable cure for *intemperance*. It not only lessens the desire for alcoholic drinks, but supplies their place, and removes their effects.

Eve was tempted by an "*apple.*" A good God has given us the object of "the primal sin," as a great blessing. If disease and death came from the eating of the forbidden fruit, health and length of days may be found in the assiduous cultivation and regulated enjoyment of that from which the interdict of the Creator has been taken, and which his open hand has lavishly scattered over the face of this fair earth.

I am, gentlemen, with sentiments of respect and esteem for you individually, and gratitude for the honor conferred upon me in this appointment, most sincerely your friend and humble servant,

JOHN A. KENNICOTT, *of The Grove,*
Chairman of the Committee for Illinois.

REPORT OF DR. HERMAN WENDELL, OF ALBANY,

CHAIRMAN OF THE COMMITTEE FOR THE STATE OF NEW YORK.

In compliance with the second rule of instruction to State Committees, which prescribes "that each member of a committee shall collect all the information in his power as to the value of various fruits in his particular section of State, and also as to the value of new seedling varieties," the undersigned, residing in the city of Albany, begs leave to report, that he has confined his observations mainly to the productions of the vicinity of that city, but occasionally to the character of particular varieties from other parts of the State. When writing of well-known fruits, it is deemed unnecessary to describe them minutely, because reference can always be made to standard works, and consequently it is only done when varieties of recent introduction or seedlings are under consideration.

Apples.—The specimens of this fruit which have been examined were grown at Greenbush in Rensselaer county, on a gravelly loam; at Niskayuna, about eight miles north of the city, in a sandy loam; at my own place, about a mile west of the city, on a sandy loam, with an admixture of clay, well supplied with lime, ashes, and stable manure; and also in a few instances from Columbia county, near Kinderhook, where the soil is a gravelly loam.

In all these several localities, I find that the yellow harvest, Sweet bough, Early strawberry, Baldwin, Roxbury russet, yellow and green Newtown Pippins, R. Island greening, Vandervere, Swaar, Esopus Spitzenburg, Fall pippin, Dominie, Westfield, Seek-no-further, yellow Bellefleur, thrive and bear large crops of fair fruit, and are not troubled with disease of any kind. The same is the fact at my own place—and some others in the vicinity of this city, where the soil is of similar character—with the Gravenstein, Rambo, Holland, Pippin, Herefordshire, Permain, Ladies' sweeting and Lady apple. My attention has been called to the Norton's Melon apple,

a delicious winter variety which originated in western New York in the vicinity where that valuable and favorite variety, the Northern Spy, was first discovered; when first disseminated, the Norton's Melon was said to be an autumn and early winter fruit, but specimens retaining their pristine appearance, juiciness, flavor, and consistence, kept without extra care, were eaten and examined by myself about the middle of February last; and the same has been done by several persons in Rochester, which proves the variety to be a good keeper, and consequently a more valuable one for general dissemination than was first supposed. A full description, with an outline, will be found in the transactions of the New York State Agricultural Society for 1848, to which I refer the Convention; also to the Wagener apple, which originated in Penn Yan, Yates county, New York. This was also until recently thought to be an early winter variety; but the experience of several seasons prove it to be, without extra trouble, a late keeper, and one which retains its juiciness and good character until March and April.

A full description, together with a beautiful colored engraving and an outline, will also be found in the same volume of the Transactions of the New York State Society. I will only add in relation to it, that all within the description referred to can be strictly relied upon, and that in my opinion it fully merits the praises bestowed upon it by the committee of that society. Also to a new seedling apple, to which I have given the name of Kingsley apple. This variety originated on the farm of Mr. Kingsley, in Pittsford, Monroe county, in this State.

This fruit has a peculiarly rich and agreeable flavor, an unusual supply of delicious juice, and is in eating order at a season of the year, without extra care, when very few other varieties are in good condition. The specimens from which the description was written were eaten on the tenth of June, and were as fresh and free from defect as when taken from the tree. This alone would entitle it to consideration, but, taken in connection with its other qualities, renders it well worthy of recommendation and name. The original tree is now growing in Pittsford; it is owned by Dr. Moses Long, who recently purchased the farm on which it stands, and to whom I am indebted for the above information in relation to its history, as well as for the fruit from which I have written the description.

My attention has also been directed to several other varieties of seedlings, none of which, without further information and trial, do I consider worthy of especial notice. Among those included in this notice are the Stannard grown by Col. Hodge, of Buffalo; a seedling grown by Thomas R. Peck, of of West Bloomfield, Ontario county; a seedling resembling somewhat the yellow Bellefleur, said to be a long keeper, received from George Bristol, Esq., of Oneida county; a seedling from Henry Snyder, of Columbia county; a seedling from Jacob Teller of Rensselaer county; one from J. D. Coe, Esq., of Seneca county, and one from De Ruyter, Madison county, called there the Enos apple.

Pears.—My attention to pears has been confined principally to those grown by myself on a sandy loam. I have a very large collection, many of them in full bearing; but a great number too young to enable me to judge of their qualities, as I consider it necessary, in order to enable us to form a correct opinion of the character of a variety, that the tree has age sufficient to give it vigor of constitution. The blight, that seriously felt destroyer of the pear in nearly all regions of our country, is as prevalent in the vicinity of Albany as in any other section of the State; and notwithstanding some gentlemen have fancied that they had discovered that certain varieties were more exempt from its influence than others, I cannot bring myself to agree with them, because having been a close observer of the disease for several years past, in various sections of the State, I have seen it in all its virulence, destroying numbers of those supposed to be exempt, while those presumed, from their foreign origin, enervated constitution, or other cause, to be peculiarly liable to its attacks, were spared when growing in the same gardens or orchards. The cause of the disease seems to be as much a matter of dispute and discussion now as it was years since; scarcely two growers agree in their opinions in relation to it. I shall, therefore, take up no time in its discussion, but must be indulged in being allowed to recommend a course to cultivators, which, from analogical reasoning, seems to be rational and sound, and since the adoption of which,—whether from the plan pursued or accident, I do not pretend to decide—I have certainly suffered very little comparatively to what I did previously.

It is a settled and an undisputed fact, that persons as well as animals, when enervated in constitution from any cause, are more liable to the attacks of epidemic or contagious diseases than those not so circumstanced. Why may it not be the same with trees? Thinking that I had discovered blight to be either contagious or epidemic, (which I shall not as yet say,) from the fact, that when a tree was attacked, others in its immediate vicinity were apt to be affected in a similar manner, I determined to try what the application of crude iron-filings, to and among the roots, both when planting out and afterwards, would effect. Iron I knew to be a tonic, and that when applied in the form of filings or turnings, it could not injure, because it becomes oxidized gradually, and consequently but a given quantity would be taken into the circulation of the tree; therefore I applied it, and now, while trees of neighbors are badly affected with the disease, mine suffer but slightly. I, of course, do not depend upon this remedy, but the moment a tree is discovered to be attacked, that moment I amputate the limb far below the least appearance of disease. I am also careful that the blade of the knife is perfectly clean, and that it has none of the sap of a diseased tree adhering to it; because I have known many valuable trees destroyed by having been inoculated in this manner with the vitiated sap of a diseased tree. The well known and already described varieties which flourish, bear well, and are not attacked by disease, except the blight, in the vicinity of this city, are the Citron des Carmes, the Bloodgood, the Rosteizer (the most delicious summer variety with which I am acquainted), the William's Bonchrétien, the Flemish Beauty, the Beurré Bosc, the Doyenne Gris, the Muscadine, the Beurré Diel, the Duchesse D'Angoulême, the Seckel, the Gansels Bergamot, the Beurré de Capiaumont, the Bleeker's meadow, the Inconnue, the Van Mons, the Winter Nelis, the Beurré-gris d'Hiver nouveau, a very valuable variety in eating about January, the Louise Bonne de Jersey, on pear or quince equally well, and the Urbaniste. A large number of other less known varieties have borne in my collection on young trees and promise to be valuable additions, but before recommending them, I would prefer a few more seasons' experience; among them are Doyenne d'Eté, a beautiful and delicious early variety, ripe on the sixth of August this year, (1849;) the St. Dorothea, an autumn variety; the Belle et Bonne de Hee, an autumn variety; the Beurré Goubalt, an autumn variety and great bearer; Leon le Clerc Van Mons, a large and beautiful variety; the Compte de Lamy,

an autumn variety, and several others, a number of which were received by me with strong recommendations, are now under trial; several, I apprehend, will be discarded for want of merit, when more fully known. I have seen sufficient to induce me to cease cultivating the Easter Beurré on pear-roots, (on quince it is said to be better,) the Beurré Cadette, or Beauchamp, the Beurré de Louvain, the Beurré Knox, the Juliene, the Doyenné musque, and Nouvelle Mabille. The white Doyenne in most collections in the vicinity of Albany is nearly worthless, while in some it is as beautiful and valuable as in its palmiest days. The cause of this difference of character is probably owing to some deficiency in the soil; what that is, must be discovered either by analysis or experiment. I am at present engaged in various experiments to test the matter, and if successful in recovering trees on which the fruit borne has been diseased, I will communicate the fact in a future paper.

Stevens' Genesee Pear.—I embrace the present opportunity to correct an error in relation to the history of this valuable variety, into which the Fruit Committee of New York State Agricultural Society were led, during the winter of 1847, by a gentleman who professed himself familiar with the history of the fruit; and which is introduced in their report of that year, as well as published in the transactions of the society.

The Stevens' Genesee pear originated on the farm of Mr. Francis Stevens, of Lima, Livingston county, New York, and was introduced to public notice by Mr. Guernsey, of Pittsford, Monroe county, who gave it the name it now bears. A full history of it may be found in one of the early volumes, the 5th I think, of the Genesee Farmer, which may be relied upon as being strictly accurate, and to which I beg leave to refer the reader.

Plums.—The vicinity of Albany, having long been known as a region of the State in which plum trees have grown and borne fruit in great perfection, I may be expected to treat more voluminously of them than of some others. The soil apparently best adapted to the well-doing of this tree and fruit, being that which contains in it a large proportion of argillaceous matter, and as nearly every locality in the immediate vicinity of the city is well supplied with that ingredient, the reason of the success in the cultivation is very obvious. All varieties of hardy constitution grow well and bear abundantly, notwithstanding that pest to plum cultivators, the curculio, destroys every year a large proportion of the crop. Various remedies have been recommended for the protection of young fruit from its attacks. I would therefore recommend the growers to try such as they consider most rational, and communicate the result of their experiments to the public, through the horticultural journals of the country.

Plum trees are also with us liable to the canker or black-wart; the poorer varieties, and those of dark colors, are thought to be most apt to be affected with it. Planting on well-drained lands, thorough cultivation around the trees, and manuring them with lime, ashes, and a small quantity of salt, will, by the tonic effect induced, render them more likely to escape the disease than if left to themselves; but if the trees are attacked notwithstanding this course be pursued, free amputations of diseased limbs must be resorted to. The varieties which are cultivated, found hardy, and bear abundantly, are the Drap d'or, Reine Claude, Washington, red magnum-bonum, white magnum-bonum, yellow-egg, virgin, Coe's golden-drop, Nectarine, Prince's imperial Gage, Lombard, Lawrence's Gage, Bleecker's Gage, Deniston Red, Albany beauty, Mulberry, Buel's favorite, Jefferson, Peter's

large yellow, Columbia, Schenectady, Catharine, a delicious purple plum, equal to Reine Claude, fully described in volume 13th of Hovey's Magazine, and copied therefrom into the volume for 1847 of our State Agricultural Transactions,—Ickworth's Imperatrice, Coe's late red, Prune D'Agen for prunes, purple favorite, red gage, and a few others. The Prune Peche, or peach plum, is not sufficiently hardy to withstand our winters, as is the case with the Orange, the Rivers' seedling, so highly recommended by Rivers in a recent number of the Horticulturist, the Roe's autumn gage, the Bingham, the Fotheringham, the royal Hative and Louis of Orleans. The Waterloo, the king of plums, and the first importation of Reine Claude de Bavay prove to be Coe's Golden drop. This was predicted by Mr. Rivers, in relation to the latter, as some mistake had occurred with it by ignorant continental nursery-men; the second importation may be correct, and meet our expectations; it is now under trial.

Guthrie's Apricot Plum,—a beautiful variety, has fruited for the first time in Albany, this season, 1849. Its size varies from medium to large, its form is oval, but slightly flattened at either end, its exterior color is of a rich, lemon-yellow, with fine crimson dots around the stem, and on the exposed side; its texture is rather firm, but juicy and rich. The color of its flesh is yellow, its flavor is of an apricot character, its stone is small and adherent to the flesh, its stem is inserted in a narrow but deep depression. The color of the young wood is light greenish-red, its growth upright and quite thrifty, its season of ripening from the 25th of August to the 1st of September. It originated from seed planted by J. Guthrie, of Scotland, and as it proved to be hardy and prolific, and is also a handsome fruit, it may be considered by some a desirable acquisition; although its season of ripening is the same as many of the finer American seedlings, which far surpass it in size and deliciousness, as well as lusciousness of texture and juice. I myself do not consider it worthy of general dissemination, notwithstanding it well deserves a place in the amateur's collection. There are a large number of seedlings, possessing more or less of merit, some of them but very little inferior to many of the well-known varieties above named, growing in the vicinity of this city; but as the standard of excellence which new varieties must attain in order to entitle them to name or notice, is, that they are superior in some particulars to any now under cultivation, and as none of them come fully up to that high requirement, I cannot give them further attention.

Cherries.—Nearly all the finer and well-known varieties of the cherry are grown by cultivators in the vicinity of Albany; it, as well here as in other places, flourishes and bears best when grown in well-drained, warm, deep, and rich gravelly loam. As the varieties grown are all described in pomological works, and to which reference can be made, I will merely name those which bear fine crops and are the best fruits, viz.: May-duke, early white-heart, Belle de Choisey, black Tartarian, black eagle, Graffion or yellow Spanish, Elton, Elkhorn or Tradescant's black, Bigarreau, Couleur de Chair, Napoleon Bigarreau, Holland Bigarreau, Downer's late Red, Late Duke, Waterloo, and Wendell's mottled Bigarreau, a new, large, delicious, and late variety, recently grown from seed by myself, and which is fully described in the first volume of the Horticulturist, and the thirteenth volume of Hovey's Magazine. A large number of other foreign as well as native varieties are under cultivation, but a few years must elapse before their characters can be fully tested.

Peaches.—To the cultivation of the peach little attention is paid in the vicinity of Albany; owing to the vicissitudes of our winters, they are an uncertain crop and liable to destruction. I, therefore, do not consider it worth my while to devote any time to their consideration.

Apricots.—I have tried numerous varieties of this fruit, and found none of them, except the Breda, able to withstand many of our winters; it does, however, and I would recommend its cultivation to growers of fruit, as it is a delicious as well as beautiful variety, though small in size.

Nectarines.—The same must be said in relation to this fruit that I have said of the peach, as it is only in protected enclosures that they appear to do well; in such situations I would recommend the Boston and Downton, as varieties which will not disappoint growers.

Currants.—Several new varieties of the currant have been introduced to the attention of cultivators within a few years past, viz: The Knight's sweet red, of a beautiful red color, with large clusters and berries, and much more palatable than any other of the red varieties; the cherry currant having large and beautiful berries, but more acid than the above; the Victoria, a red variety, coming later to maturity than either of the above, and also more acid; the White Grape, of a greenish-white color, with long bunches and large berries, of the flavor of the old white Dutch, a desirable variety. The above new varieties, together with Black Naples—a large and very fine black variety,—the old Red Dutch, and the White Dutch, are grown in great perfection in our whole vicinity.

Raspberries.—The raspberry requires slight protection in order that it may withstand our variable winters; with such care and proper cultivation, it succeeds admirably. The best varieties grown are the Fastolff, the Franconia, and the White Antwerp; other varieties, as the Red Antwerp, the Victoria, the Beehive, and May's Giant, are grown to some extent, but are in my opinion inferior to the above. The Ohio Ever-bearing is a variety worthy of cultivation by the amateur; the berry is of a medium size, of bluish color and pleasant flavor.

Gooseberries.—The gooseberry suffers severely in some gardens with blight or mildew; various of the recommended remedies have been tried with more or less of success, but that course in their management which is most successful is to trench and manure the earth deep before setting out the plants, and then covering the earth around and under them with salt meadow hay. This course keeps the roots cool, allows them to penetrate deeply into the earth, gives the plant vigor to withstand disease, and the saline atmosphere which surrounds the bushes probably destroys the germ of the insect which is by some supposed to cause the mildew. A large number of varieties are grown in this vicinity, among the best of which are Sheba Queen, Lady of the manor, Lord Creve, Golden Walnut, White Eagle, Edward's Jolly Tar, and Woodward's Whitesmith.

Strawberries.—This fruit is grown extensively in the vicinity of Albany. The varieties mostly cultivated for market are, the Hovey's seedling and the Virginia scarlet. Nearly all the other valuable, or supposed to be valuable varieties, are grown by different individuals, and as the peculiarity of flavor in the various varieties is about as different as is the taste of different persons, most of them have their several advocates. I shall not attempt to describe, or even mention the names of the varieties grown, but will only allude to one or two of which much has been said. The Burr's new pine has fruited in Albany two seasons; it has proved to be hardy, very prolific, and a very delicious variety. The other seedling of Mr. Burr possesses more or less merit, but the above is the best. The Aberdeen Beehive has fruited this season, 1849, in three collections; it is prolific when grown in single hills, but not more so than many others. The berry is of medium size, of very good flavor, but, taken as a whole, when compared with many other varieties, is unworthy of extensive cultivation. It is said to be valuable as a forcing variety; of this I have had no experience.

Grapes.—The only grapes cultivated to any extent without the protection of a grapery are the Isabella and Catawba; the first, being the earliest, is most certain to mature its fruit, but in order to insure a crop in other situations than the sheltered enclosures of our cities, it is necessary that they be protected during the winter months.

FARMING AMONG THE SIOUX INDIANS.

SAINT PETERS, MINNESOTA, 10 *Nov.*, 1849.

SIR:—I notice from the Patent Office Reports, that it is your wish to obtain all the information you can from the different parts of the Union, in relation to farming, &c. I do not find any thing from our newly sprung up Territory of Minnesota, and supposing you might not be displeased to receive some information from this part of the country, I have, with the assistance of a friend or two, collected such accounts of the agricultural means of our new Territory, as I suppose it would be desirable to make public. I have also sent you some account of the mode of cultivation among the Dahkotah (Sioux) Indians, with a list of the roots, &c., used by them as food, and a short description of their manner of procuring, cooking, and curing them for use.

When I first removed into this country in the winter of 1819–20, the Indians planted small patches of corn, digging the ground with a hoe purchased from the trader, or the branch of a tree sharpened. Their fields were from ½ to 1 acre, the hills raised from 8 to 12 inches high, the top levelled to the size of 6 or 8 inches in diameter, and from 10 to 20 grains of a very small kind of corn were planted in a hill. The produce, ears of corn from 3 to 8 inches long, was mostly consumed as roasted corn, though some was boiled when green, the grain being then scraped off the cob, and dried in the sun. Thus cured, the corn will keep 2 or 3 years. When a dish of green corn soup is wanted in the winter, the Indians throw in a couple of handfuls of this sweet corn into a kettle of venison, and in half an hour they have a dish of fine rich soup.

Of wild roots there are several kinds that the Indians dig for food, when other food is exhausted.

1st. *Mendo, or wild sweet potato.*
2d. *Tip-sui-ah, or wild prairie turnip.*
3d. *Pang-he, or artichoke.*
4th. *Omen-e-chah, or wild bean.*

The first is found throughout the valleys of the Missisipi and St. Peters, about the bases of bluffs, in rather moist but soft and rich ground. The

plant resembles the sweet potato, and the root is similar in taste and growth. It does not grow so large or long as the cultivated sweet potato, but I should have thought it the same, were it not that the wild potato is not affected by the frost. A woman will dig from a peck to a half a bushel a day.

The Indians eat them, simply boiled in water, but prefer them cooked with fat meat.

The second (prairie turnip), grows on the high dry prairies, one or two together, in size, from that of a small hen's egg to that of a goose egg, and of the same form. They have a thick black or brown bark, but are nearly pure white inside, with very little moisture. They are met with 4 to 8 inches below the surface, and are dug by the women with a long pointed stick, forced into the ground and used as a lever. They are eaten boiled and mashed like our turnip, or are split open and dried for future use. In this state they resemble pieces of chalk. It is said that when thus dried they may be ground into flour, and that they make a very palatable and nutritious bread. Mr. Lamare Picot, a French naturalist, has lately incurred a very considerable expense to obtain the seed, which he has carried to France, believing that it is capable of cultivation, and may form a substitute both for potato and wheat.

The third (wild artichoke) is found in every part of the country where the land is rich and loamy, but particularly near fallen and decayed timber. It is a plant too well known to need further notice. It is eaten only by the Indians when in a state of starvation, from dread of its flatulent qualities.

The fourth (wild bean) is found in all parts of the valleys where the land is moist and rich. It is of the size of a large white bean, with a rich and very pleasant flavor. When used in a stew, I have thought it superior to any garden vegetable I had ever tasted. The Indians are very fond of them, and pigeons get fat on them in spring. The plant is a slender vine, from 2 to 4 feet in height, with small pods 2 to 3 inches long, containing 3 to 5 small beans. The pod dries and opens, the beans fall to the ground, and in spring take root and grow again. The beans on the ground are gathered by the Indians, who sometimes find a peck at once, gathered by mice for their winter store.

We have also several kinds of edible roots growing in the ponds or small lakes, and gathered by the Indians for food.

The *psui-chin-chah*, or *swamp potato*, is found in mud and water about 3 feet deep. The leaf is as large as the cabbage-leaf. The stem has but one leaf, which has, as it were, two horns or points. The root is obtained by the Indian women; they wade into the water and loosen the root with their feet, which then floats, and is picked up and thrown into a canoe. It is of an oblong shape, of a whitish yellow, with 4 black rings around it, of a slightly pungent taste, and not disagreeable when eaten with salt or meat.

The *psui-chah*, with a stem and leaf similar to the last, has a root about the size of a large hickory-nut. They grow in deeper water, and being smaller are much more difficult to get, but the Indians prefer them; they have an agreeable taste, and are harder and firmer when cooked. Both these roots are found in large quantities in the muskrat-lodges, stored by them for winter use.

The *ta-wah-pah*, stem, leaf, and yellow flower, like the pond-lily. It is found in the lakes, in water and mud, from 4 to 5 feet deep. The Indian women dive for them, and frequently obtain as many as they are able to carry. The root is from 1 to 2 feet in length, very porous; there are as many as 6 or 8 cells running the whole length of the root. It is very difficult to describe the flavor. It is slightly sweet, and glutinous. It is generally boiled with wild fowl, but often roasted.

All these roots are preserved by the Indians for their winter use, by boiling, and then drying them in the sun or over fire.

The *wild rice* is another and very favorite article of food with the Indians. They use it in all their great feasts. It is found in lakes, where the mud and water are from 5 to 20 feet deep. The rice harvest continues only from 4 to 8 days; when ripe, the slightest touch shakes it off, and if the wind should blow hard for a day or two, the rice is all lost. The Indians obtain it by paddling a canoe among the rice, when, with a hooked stick, they draw the stem over the canoe, and then whip off the grains. They continue to push about the canoe, and whip off the rice, until the canoe is full, carry the cargo on shore, and return again; and so continue until the rice season is ended. To dry the rice, they erect scaffolds about 4 feet high, 8 feet wide, and 20 to 50 feet long, covered with reeds and grass. On these the rice is placed, and dried by a slow fire kindled under the scaffold and kept burning about 36 hours. The beard is longer than that of rye, and to remove it and the chaff, they make a hole in the earth about 1 foot wide and 1 foot deep, in which they place a piece of skin. About a peck of the dried rice is placed in this hole at a time, and an Indian steps in, and holding himself steady by a stake planted near, he commences half jumping, first on one foot, then on the other, and so continues until the rice is ready to winnow. It is then cleaned, and put into bags to be stored. Being of a dark color, the wild rice is not so good-looking as the Carolina rice, but the flavor is generally preferred. In preparing rice, the men take an active part. In gathering and curing all the other articles of food I have named, the women only are employed, and I believe that three-fourths of the food of an Indian family is thus supplied by the women.

In the settled parts of the territory, the only grains I have known raised are wheat, rye, oats, barley, and Indian corn. Spring wheat is an excellent crop, yielding in some extraordinary instances as much as 40 bushels, but upon an average 25 bushels per acre. Fall wheat has hitherto failed, from being winter-killed. In a few instances where it has escaped, the yield has been very great. In the year 1842, 4 bushels of winter wheat were put on 2 acres, the land adjoining a piece of standing timber. One acre was entirely destroyed and ploughed up in the spring; the remainder, next the timber, was left and harvested, and 54 bushels of clean wheat was the produce. Rye appears to answer well wherever it has been tried; it does not suffer as the wheat, and the yield has surpassed the expectation of all who have raised it, but I am not able to state accurately the amount per acre. Oats make a large return, and it is a general observation that they are vastly improved in quality when the seed is brought from below. 50 bushels per acre is a common crop; 6 acres have yielded over 300 bushels, when the oats could not be cradled, having been so much thrown down by a storm, and in mowing and raking the loss was undoubtedly very considerable. The weight varies from 34 to 45 lbs. Barley is also a very profitable grain; 60 bushels per acre may be calculated on, although that amount has been obtained from less than ¾ of an acre. Of Indian corn we have at present raised but two varieties; one, a large white 8-rowed kind; the other, a small white corn, which is only valuable from ripening so very early. The largest crop of the first kind produced here gave 90 bushels to the acre, the

corn being weighed after it had been stored in the upper chamber of a house until it was very dry. Of this corn, I believe an average crop yields 50 bushels and upwards, whenever it escapes the ravages of the blackbirds. The smaller corn I have known planted after the 10th of June, and perfectly ripe at the end of August. It yields 30 bushels to the acre.

At present no manuring of the land has been necessary, and throughout the whole Territory the crops I speak of have been raised with very little preparation or culture.

Both climate and soil are particularly favorable to root crops. Potatoes are of a very superior quality, and appear to surprise all who arrive here from other parts of the United States, both by their quality and quantity. I am only able to state the amount per acre of one yield—it was a piece 3¼ acres—the potatoes were of two kinds, the Irish gray and a dark-blue kidney; planted in hills, but not earthed up, and only once hoed; the produce 450 bushels per acre.

The rot visited us first in 1845, and has not yet disappeared. It has been observed to affect the potatoes most in moist lands, and has seldom attacked the plant in entirely new land. It has not injured the firm-fleshed potatoes so much as the tender ones, such as the Meshannocks. I believe it to be caused by the state of the atmosphere, as I have observed the plant to be attacked generally after very heavy dews.

Both the white turnip and ruta-baga answer well, but I am not aware of any one having ascertained the amount produced per acre. Where the ruta-baga has been sown broad cast, it has seldom been touched with the hoe, and yet I am of the opinion the roots will average seven pounds each, and that 700 to 800 bushels have been gathered from an acre. Every kind of the ordinary garden vegetables is grown in great perfection.

But the farmer in Minnesota Territory has still greater prospect of profit from raising cattle. During the years I have lived here, I have found no disease prevailing; the horn-ail occasionally occurs, but not near so frequently as in other parts, which I attribute to the even and dry nature of our winters. The wild feed appears to be singularly fitted to fatten cattle during the summer months, and to sustain them during the winter.

Wherever rushes can be found in sufficient quantity, it is quite unnecessary to prepare any other winter feed. Oxen will not only keep fat, but rapidly fatten on them during the winter, and, contrary to the general impression, I can vouch for it that they will stand work in the winter on the same feed. During the summer and fall, nature has provided the best kind of food for cattle, for they certainly fatten more upon the run than by any artificial feeding I have known. A case has been stated to me, when after breaking and planting with a yoke of oxen and a yoke of four-year old steers, the steers were turned out in very poor condition on the 20th July. In October one of them was slaughtered, and gave 910 lbs. of beef to the 4 quarters, and 120 lbs. of rendered tallow. A two-year old buffalo bull, also slaughtered off the run, and not at the best season, viz: in September, yielded 450 lbs. of beef to the 4 quarters.

A long residence in the country of some of the Indian traders, with an opportunity of observing many horses, has enabled them to state the singular freedom from disease of this animal. Instances are frequent of horses finding their own living throughout the winter, and doing well.

Hogs have only been introduced into the country since it was purchased of the Indians and began to be settled. The importation of a Hampshire

boar, and subsequently of a Byfield, and then a Berkshire, has contributed to form a very valuable breed; not too tender for the climate, and with tendency to fatten derived from the last two varieties, rendering them a profitable kind for this country. However, pork raising will never become a business in which we can compete with the farmers of Illinois, Indiana, or Ohio. Hogs of 18 months or 2 years seldom fatten over 250 lbs.

Very few sheep have been brought into the country, although the little experiment that has been tried with them was very promising. The sheep were brought from Missouri, and rapidly improved both in size of carcass and quality and quantity of wool. They wintered without any extra care, and had no sickness. The same observation was made of a small flock of about 200, which was kept by an Indian trader on the St. Peter's river, 350 miles from this place. During several years they never suffered from any disease, and had no wintering but the wild hay cut for his horses and cattle. From the sheep brought from Missouri, which gave 3½ to 4 lbs. of wool in Missouri, those raised here, at three years old, yielded 7½ to 8 lbs.

An agricultural society has lately been formed here under the advice of the governor and sanction of the legislature, and should you think this distant Territory worth notice, future years may furnish more important details.

I am sir, yours very respectfully,

PHILANDER PRESCOTT,

Superintendent of Farming for the Sioux.

To the Hon. Commissioner of Patents, Washington.

WHEAT *vs.* CHEAT.

RICHMOND, WAYNE CO., INDIANA, *4th mo. 14th*, 1850.

ESTEEMED FRIEND:—My only motive in writing to thee is to correct as far as I can, a most mischievous statement of a correspondent of the former Commissioner in his Report for 1848, p. 471, in which an account is given of an experiment in growing *cheat*. He says: "From which I infer that there is no danger to the farmer from a reproduction of cheat, that may inadvertently be sown with wheat, and that cheat is nothing more nor less than degenerated wheat." Now I will venture to think, at least, that the cheat sown was not sound, or it would have grown as well as any other grass-seed.

Upwards of 40 years since, I was present when this subject was largely discussed (and not very far distant from the residence of this correspondent), the one contending that it was degenerated wheat, which turned to chess; the other more rationally maintaining that it was of the family of grasses, and would grow.

As soon as they left I went to the barn, and got about a gill of chess-seed, which I sowed carefully in the garden: and I venture to say that a more luxuriant crop was seldom seen from the same amount of grass-seed, and as far as my close observation and experience go, I am prepared to say that chess-seed will grow, and that wheat will not turn to chess.

I regret that an opinion so mischievous in its consequences should have so large a circulation as this has through the Commissioner's Report. It is

certainly calculated to make the careless and unobserving farmer more careless. However, I readily admit there are, or used to be, portions of Montgomery county that would not grow cheat, nor any other grass.

I think it would be safe to say that our wheat crops never looked more promising than at this time, for the last 30 years, though the spring has been remarkably dry and cold.

Sincerely thy friend,
JOS. P. PLUMMER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

CULTIVATION OF FLORIDA TOBACCO.

WASHINGTON, *April 15th*, 1850.

DEAR SIR:—I inclose you a letter upon the culture of the Florida tobacco. This tobacco is sold in market at a price varying from fifteen to seventy-five cents a pound, and occasionally I believe a higher price has been obtained.

I also send you a diary of meteorological observations at St. Augustine, made during the last winter, which may be interesting to you. St. Augustine is in the northern part of the Peninsula of Florida. The peninsula extends into a latitude entirely beyond the region of frost. Altogether the best sugar and sea-island cotton country in the United States is on that peninsula. The lands are very fertile, and at present cheap; the climate agreeable and healthy, and the facilities of water communication with market very good.

Respectfully your obedient servant,
D. L. YULEE.

Annexed will be found the valuable communication on the culture of Florida tobacco, referred to in the above note of the Hon. D. L. Yulee.

We are also indebted to Mr. Yulee for a copy of a letter from the U. S. consul at Oporto on the culture of the olive, a fruit which can doubtless be successfully cultivated in Florida and other Southern States.

OCOLA, MARION CO., FLORIDA, *March 10th*, 1850.

MY DEAR SIR:—The peculiar character, as well as the high price obtained for Florida tobacco, has lately created a great deal of inquiry as to the proper method of its cultivation.

At your request I will undertake to give you such practical remarks as will, I hope, enable you to successfully grow the plant; together with some ideas adapted to its housing and preparation for market.

The object in cultivating "*Florida wrappers*" is to produce an article that will command the highest price *per pound*. To do this, select your seed with care. The "Long Green" and "Pear Tree" are preferable to any other. These varieties *spot* better, and produce a finer leaf than any I have ever seen. When brought to perfection, the leaf is of a bright cinnamon

color, having thousands of small white spots covering the surface. These spots it is that gives character to the tobacco, for without them the article is comparatively worthless.

Plant Beds.—Select for your plant beds a natural rich loam, a warm spot, always moist, without water lying on the surface, and where it can have the benefit of the sun. Upon this piece of land, say 15 feet long by 9 feet wide, pile brush about waist high any time during the winter, taking care to have the edges of your piles higher than the centre; burn off some dry day about the 1st of March; after the burning of the brush, and as soon as the spot is cool enough, dig deep with a grubbing-hoe; cut and chop out every root, no matter how small; in fact, leave nothing but the mellow earth, well pulverized; rake off nicely with a fine rake, and your bed is ready for the seed. To be certain, however, of a full supply of plants, it is advisable to have more than one bed. Those having most experience plant every two weeks, commencing about the middle of February and planting the last about the middle of April. It is better to have several beds too many than to fall short 100 plants.

To plant the Seed.—For a bed of the size mentioned, mix a table-spoon even full of seed in about a quart of sifted ashes; sow in the same manner as your turnips or cabbage seed, regulating your hand to the size of the bed and quantity of seed; rake them in with a fine rake and tramp your bed in every direction, until it is compact and firm; rake level and sprinkle with water: if this is properly done, it is not probable that grass or weeds will trouble you; should they, however, they must be carefully pulled out.

The cut-worm is generally the first enemy to attack tobacco, and it is likely you will find them in these beds. A shower of soap-suds from your watering-pot will drive them from their hiding places, when of course you will destroy them. The soap-suds is also an excellent manure, and, with a slight sprinkling of ashes immediately after, will drive off the flea or fly, a small black insect that perforates the plant, and sucks from it all nourishment, leaving it to wilt and die in the bed. Be careful that you do not allow your plants to crowd too much in the bed. After they have attained sufficient size for transplanting, and you are not ready, or if it is too soon, pull them up, and let others take their place. When they have attained their sixth leaf they are about the right size to transplant.

Second Culture.—New land is always planted with us. Rich, gray hammock is best adapted, although pine land, if of a sandy loam and lightly cowpenned, answers well, if not too flat. (In my directions to you, however, I am treating of hammock land entirely, and arranging for a crop of two acres.)

It matters little whether you select a level or *undulating* piece of land, only be particular that it is not liable to drown, or *wash much*, during the heavy rains of summer.

Having selected a desirable piece, you commence at any convenient period of the winter:—First, by cutting all the undergrowth in a regular manner, falling it such a way as to cover as equally as possible the whole surface intended to be planted; next, your small trees, and lastly the larger ones, which cut into convenient lengths for log-rolling or rails, as you may desire, lopping the tops so they will burn.

Experience has proved that the best tobacco is obtained from plants set out in the month of May; it is therefore advisable so to arrange your labor as to do all your transplanting in that month.

Presuming the timber has been levelled as required, about the middle of April burn it off and roll the logs not burnt. These you can set fire to again, or permit them to remain. If you set fire to the log-heaps, the earth beneath them will be too much burned to produce vegetation of any kind; if they remain, the ground they occupy of course cannot be planted. After burning off, and all trash and brush is raked off, plough up your land, cutting and tearing out as many of the roots as possible. These roots should be carried off or burned. Next check the land by running furrows three feet each way. The grubbing-hoe is the next article required.

A good strong hand should commence in the cross of the angles and dig out all the remaining roots and loosing up the earth for the hill; a weaker hand may follow, making a large flat hill with a depression in the centre, that the water may find its way and be retained near the roots of the plant. I would again go over this land with a hoe, cutting off all projecting roots or sticks, as well as to rake out the trash thrown from the newly-made hills, which, if left in the field, will harbor many grasshoppers and other insects, enemies of this plant. Besides, if you leave small roots or sticks projecting out of the ground, you will find they tear and bruise the leaves after they begin to grow and receive the wind. This is of importance, for recollect that the smallest puncture (of a pin, for instance) in a young and tender leaf will be a hole when the leaf is grown that you could readily pass an ordinary quill through, and as your object is to raise an article *for wrappers*, a defect of this character, if extensive, would be fatal to the profitable sale of the crop.

We have now reached the transplanting season, which is the first of May (a few days earlier or later is not material), if you have showers or "seasonable weather," but do not wait for them—rely upon your watering-pot and a bunch of moss or palmetto leaf to protect the plant. The plants should be carefully taken from the seed-beds, by pulling them up and placing them in baskets, using great caution not to bruise the main stem or break the leaves. Plant one stock in a hill erect and about the same depth it stood in the bed. To do this properly, take the plant in the left hand and with the right scoop out from the centre of the hill sufficient earth; set the roots of the plant in the hole, and cover, pressing the dirt gently but firmly around it, after which pour on about half a pint or pint of water; this settles the earth compact and firm, and gives you an assurance that the plant will live. Do this work well, and be careful in doing it, else you have had your trouble for nothing. A sickly plant requires more care than a flourishing one, and in the end generally dies after it is too late to replant. Green moss is better than any thing I know of for covering and protecting them from the sun, as it retains moisture during the day, and keeps the ground cool around the roots. It should remain on four days, taking it off in the evening. A small handful laid over the plant, and water sprinkled on it, will insure the plant to live, provided the cut-worm does not interfere. In about ten days after transplanting, hoe out what weeds may have sprung up, and draw a little earth to the plant, making a small hill. It requires no other working.

Up to this time I have only alluded to worms; now it is necessary to mention them particularly, as they appear by millions, having different forms, and attacking the plant in various ways. Let me mention them in the order in which they attack the plant.

1st. The cut-worm commences its depredations in the seed-bed, nipping out the bud, or cutting the plant off at the ground. It also eats into the main stem after you have transplanted.

2d. The bud-worm attacks after transplanting, preying upon the tender bud, which it will destroy in a short time if allowed to remain.

3d. Black-head, or glow-worm, appears to breed in the leaf, eating its way in every direction, leaving little else than the stems and epidermis.

4th. Green-worm, about the size, and resembling the black-head; it eats along the edges of the leaf and stems, curling the leaf and hiding in them.

5th. The horn-worm is deposited on the smooth or upper surface of the leaf in an egg by the tobacco-fly, hatches out, eats through at once, and continues to eat until the whole plant is destroyed. This worm makes its appearance about the 20th of May; from this time forward you must use the utmost diligence in destroying them. Begin in time—hunt the eggs as well as worms, going over each plant once a day; to do which you must add to the force heretofore required, if necessary.

I cannot enforce upon you sufficiently the necessity of paying the strictest attention to this business. By vigilance you prevent the worm from doing much harm. If you relax for a day, you cause great trouble and loss.

The green and "black-headed" worms you also kill by simply pressing the leaf between the thumb and forefinger. With the bud-worm you must be more particular, as you are apt to destroy the bud of the plant in killing it. An unskillful hand at this business does almost as much harm as the worm; for the slightest bruise or least piece pinched off in taking the worm destroys at least half the leaf so mutilated. The cut-worm has already been spoken of; and although a great deal more could be said while treating of these (the greatest enemies of tobacco), it is only from experience you can ascertain with what you have to contend.

The plant will indicate to you when it has attained its growth, by forming at the top a gem or button, which if left will throw out a number of delicate flowers; finally forming great quantity of capsules containing the seed. Select a few of your best stalks for seed, and top the rest of the crop. This is done by breaking off the button soon after it is fairly formed. If your plant shows a diminutive growth, top lower than the button by several leaves, which will increase the size of the remaining ones.

From this time forward you must attend closely to breaking off the suckers, and allow nothing to interfere with the proper development of the leaves on the main stem. In about two weeks after the button is taken off, you will find the leaves near the ground beginning to ripen and spot. Do not mistake the scorched and dried up "ground leaves," for ripe and mature tobacco, for as a general thing they are not worth saving, and had better be thrown away. At times, however, we find some very pretty ones among them, which should be properly cared for.

It will not be long now before the whole stock (except the younger leaves at the top) begins to assume a lighter cast of green, and also to be studded thickly with fine white spots. Now is a time of great solicitude, and every thing that tends to mar the operations of housing and curing is truly vexatious. Let there be plenty of house-room, and have no lack of sticks. The leaves should be broken from the stalk as they ripen, and placed upon hand-barrows, or some other convenient mode of transportation, and taken to the house without being wilted in the sun. In the house they are split down the stems about four inches; then strung upon sticks, placing two leaves with their backs together, and thus continue until the stick is full, leaving a

space of one and a half or two inches between each leaf, according to their size; the largest requiring the most room. The stick being full, place it upon the rack made to receive it.

Much time will be saved in the end by assorting the tobacco while splitting it; making at least three classes, having reference to the size of the leaf, quality, and the injury sustained from the worms. In placing your sticks upon the racks do not crowd too much at first, let the leaves barely touch, after it has united close a little, and continue to do so during the drying process; until, at last, you may bring the sticks within an inch of each other.

Let me mention the horn-worm once more. They are frequently overlooked in gathering and splitting; after the tobacco has been housed three days it is well and many times important to go over it again, and take off all you may find; recollect that "one worm in the house does more harm than ten in the field."

The next thing to consider is the house and its arrangements. A house thirty feet square and ten feet high is deemed sufficient to house two acres of tobacco. In a building of this size, you would want six rows of stalls, made of pine poles, with the bark taken off, and sufficiently strong to bear the weight of a man, placed about two feet apart, one above the other, to the roof of the building, leaving a space on the side where the door is, of about 6½ or 7 feet, that the person with a stick filled may pass or repass. Besides it will afford room to split the tobacco, &c., though a shelter outside would do better for this last business. Your racks being up, you must make your sticks conform to the width of the aisles; therefore make your sticks five feet two inches in length. These you can make from pine laths about ¾ inch in diameter, smoothed off with a drawing-knife, with one end tapering, but not sharp. The two extra inches are given that they may have sufficient length to sustain a jar or jolt without falling. In the uprights of the racks, or any other convenient place about the building, bore with a ¾ inch auger a hole about three inches deep; in this hole place the large end of a stick, and you will find a firm and suitable support while stringing the leaves thereon.

Do not place the tobacco too close to the ends of the sticks, as in moving it about and sliding it on the rack, you are apt to tear or bruise the outside leaves. About forty leaves are enough to put on one stick.

When your tobacco is cured and ready for boxing, the stem of the leaf will be perfectly dry, and in clear weather quite hard. After you ascertain this, you may at any time when it is in case, commence taking down stick by stick, and as you take off the leaves assort again, making several qualities, having reference now to the manner and color it has cured. Have convenient a box for each class, and as you take it from the stick, "hand it up," that is, tie it in bundles. A bundle is formed by taking about the same number of leaves as was on the stick, and wrapping a leaf around the handful at the upper part or stems, making a band about two inches wide, tucking the end in the bundle by way of confining it. After it is made, place it in its proper box with the butts out; when the box is full, you may with a light lever power gently press it. Be careful that you do not pack too hard; after which you may fill in again. These boxes must be examined occasionally, to see that they do not overheat. This can be done by running the arm down the side of the box, and working your hand towards the centre. If you find the tobacco getting too warm, instantly unpack, when, in a few minutes, and without much trouble, you may replace it.

Tobacco, when put up in too high case, is apt to heat: this must be avoided, as it rots the leaf and makes it unfit for the purposes for which it is purchased.

Many persons "bulk" their tobacco, which is done by simply putting it in winnows on the floor, allowing it to go through a sweat before it is boxed. This however requires more judgment and neatness than I have ever seen practiced; besides, when put in winnows this way, it frequently goes out of case, in which case it is impossible to touch a leaf without crushing and breaking it to pieces. For these reasons I prefer boxing at first; for then you are able at any time to work with it and have your crop in market at a much earlier period, which is a decided advantage, as you will readily learn.

I advise you to bestow much attention to your last packing; see that your tobacco is as near one quality as possible, and as you value your interest do not allow a superior article to go on top, while at the bottom it is quite inferior.

In conclusion, I must say that I feel a great deal of diffidence in offering you these remarks. My experience is not sufficient to warrant a faithful observance of the mode of culture here adopted. Several planters of more experience, intelligence, and observation than myself, prefer planting, for instance, two and a half feet one way and three feet the other, and give as a reason, that it is more convenient, while the plant is less liable to injury during the time the hands are employed in mowing it. This may be the better distance, but my opinion is that the plants being equi-distant present more uniformity of size. Satisfy yourself upon this subject.

If I have made any thing obscure, on intimation I will endeavor to explain.

With much respect,
Your obedient servant,
JOHN G. REARDON.

To A. H. Cole, Esq.
Baywood, Florida.

CULTURE OF THE OLIVE.

Oporto, *January 22d*, 18——.

Esteemed Sir:—In a recent excursion to the Algarves, where orange trees are more cultivated than in these northern provinces, I had occasion to notice a remedy used by the farmers there to cure the trees affected by the *Ferrugen*, or to prevent its attacks.

They wash the trunk of the tree all around, for the length of a foot, with a mixture of lime, potash, and oil, or soap. I was assured that this simple preventive had greatly diminished the destruction caused by the insect.

Thinking this information might be of some service to you, I take the liberty of communicating it without loss of time. I would also respectfully call your attention to the cultivation of the olive in Florida and in most of the Southern States. Formerly the olive, on account of its slow growth, was not considered very useful; but some years since a new variety was introduced into France, and into some parts of Spain and Portugal, which yields an abundant crop of fruit the second year after planting. They are small trees, or rather shrubs, about four or five feet high. The fruit is

larger than the common olive, is of a fine green color even when ripe, and I am informed, contains a great deal of oil. The advantages accruing from this new mode of cultivating the olive tree, are beyond all calculation. By the old method, an olive tree does not attain its full growth, and consequently does not yield any considerable crop, under thirty years; whereas the new system of cultivating dwarf trees, especially from cuttings, affords very abundant crops in two or three. An acre of land can easily grow 2500 trees of the new variety, and the gathering of the fruit is easy, as it can be done by small children.

I am proud of being one of the first to introduce into the United States the culture of silk, which would certainly be more advanced, if the frantic speculations in *morus multicaulis* had not spoiled the business and deluded many good farmers.

As the cultivation of the olive does not require the least practical knowledge, and as every one in the States understands the process of making oil, I would be most happy to forward, by all means in my power, whatever your patriotic views might suggest on the subject. I should think that good olive bushes, well rooted, and with good heads, might be had here at from 18 to 22 cents each.

With sincere wishes for your prosperity and constant happiness, I remain, esteemed sir,

Your most humble and obedient servant,

L. W. TINELLI,
U. S. Consul.

Hon. D. L. YULEE,
Washington, D. C.

CULTURE OF BROOM-CORN, AND THE MANUFACTURE OF BROOMS.

THE following article is from the pen of Sanford Howard, Esq., favorably known as one of the editors of the Albany "Cultivator." The production of broom-corn is rapidly extending, and corn brooms are driving *broom-sedge*, as an article for sweeping floors, out of every humble dwelling in the Union.

"Having a few hours to spend at Schenectady about the first of September last, our friend, Mr. Charles H. Tomlinson, kindly accompanied us to several places in the vicinity, and among the rest to the broom manufactory of Messrs. Van Eppes. They have been engaged in the business about eleven years. They have a farm of about 300 acres, 200 of which are Mohawk flats. A large portion of the flats was formerly of little value, in consequence of being kept wet by a shallow stream, which ran through it, and which, together with several springs that issue from the sandy bluff on the south side of the flats, kept the ground marshy, and unfit for cultivation. By deepening the channel of the stream, and conducting most of the springs into it, many acres, which were formerly almost worthless, have been made worth $125 per acre. They have also, by deepening the channel, saving the water of the springs, and securing all the fall, made a water privilege, on which they have erected an excellent mill, with several run of stones, leaving besides sufficient power to carry saws for cutting out the handles of brooms, &c.

"They have this year about 200 acres of the flats in broom-corn. The cultivation of this article has within a few years been simplified to almost as great a degree as its manufacture. The seed is sown with a seed-barrow or drill, as early in spring as the state of the ground will admit, in rows $3\frac{1}{2}$ feet apart. As soon as the corn is above ground, it is hoed, and soon after thinned, so as to leave the stalks 2 or 3 inches apart. It is only hoed in the row, in order to get out the weeds that are close to the plants, the remaining space being left for the harrow and cultivator, which are run so frequently as to keep down the weeds. The cultivation is finished by running a small, double mould-board plough, rather shallow, between the rows.

"The broom-corn is not left to ripen, as formerly, but is cut while it is quite green, and the seed not much past the milk. It was formerly the practice to lop down the tops of the corn, and let it hang some time, that the brush might become straightened in one direction. Now, the tops are not lopped till the brush is ready to cut, which, as before stated, is while the corn is green. A set of hands goes forward, and lops or bends the tops to one side, and another set follows immediately, and cuts off the tops at the place at which they are bent, and a third set gathers the cut tops into carts or wagons which take them to the factory. Here they are first sorted over, and parcelled out into small bunches, each bunch being made up into brush of equal length. The seed is then taken off by an apparatus with teeth, like a hatchel. The machine is worked by six horses, and cleans the brush very rapidly. It is then spread thin to dry, on racks put up in buildings designed for the purpose. In about a week, with ordinary weather, it becomes so dry that it will bear to be packed closely.

"The stalks of the corn, after the tops have been cut off, are five or six feet high, and they are left on the ground, and ploughed in the next spring. It is found that this keeps up the fertility of the soil, so that the crop is continued for several years without apparent diminution. It should be observed, however, that the ground is overflowed every winter or spring, and a considerable deposit left on the surface, which is undoubtedly equivalent to a dressing of manure.

"This may be inferred from the fact that some of the flats have been in Indian corn every year for forty or fifty years, without manure, and with good cultivation have seldom produced less than sixty bushels per acre, and with extra cultivation, from eighty to ninety bushels have been obtained.

"In case of need, the stalks would furnish a large amount of good food for cattle. They are full of leaves which are very nutritive, and whether cut and dried for winter, or eaten green by stock turned on the ground where they grow, would be very valuable in case of deficiency of grass.

"Messrs. Van Eppes employ twenty hands during the summer; and in autumn, when the brush is being gathered and prepared, they have nearly a hundred, male and female. They are mostly Germans, who come here with their families during the broom-corn harvest, and leave when this is over.

"The manufacture of brooms is carried on mostly in the winter season. The quantity usually turned out by Messrs. V. E. is 150,000 dozen per annum."

ACKNOWLEDGMENTS AND CORRESPONDENCE.

The acknowledgments of the Office are due to the following gentlemen in China and the East Indies, for their kindness in collecting and forwarding to the Patent Office valuable seeds, pamphlets, &c., which have been distributed, through members of Congress and others, among intelligent agriculturists in all parts of the country:—

Hon. John W. Davis, U. S. Com. to China; Dr. D. J. Macgowan, Ningpo, China; Rev. E. V. Bridgeman, Shanghai; J. Balestier, Esq. U. S. Envoy to South-Eastern Asia; Charles Huffnagle, Esq., U. S. Consul, Calcutta; S. Wells Williams, Esq., Canton (*see letters*); Dr. B. McCartee, Ningpo.

Legation of United States, Macao, China, *June 6th*, 1849.

To the Hon. Commissioner of Patents.

Sir:—I send herewith, per American ship "Virginia," another box of seeds, and ask your attention to the two letters inclosed, as explaining the contents of the box. I hope to be able to forward another parcel in a few months.

Very respectfully, yours, &c.

JNO. W. DAVIS.

—

Canton, *June 1st*, 1849.

Hon. J. W. Davis, Macao.

My dear Sir:—I send you a box of seeds for Mr. Burke, inclosed first in tin and then put in the wooden box. They are from Ningpo and Canton, those from Canton being marked, and the others having been forwarded by Dr. Macgowan from Ningpo. I hope they will arrive in Washington in good order. I have a note from Mr. Johnson at Fuhchaufú, who promised to send me some in the autumn as he collects them, as that will be in time to reach the United States in 1850. If those from Dr. McCartee reach me soon, I will have them packed up like this box.

Yours truly,

S. W. WILLIAMS.

—

Ningpo, *Feb. 20th*, 1849.

Mr. S. Wells Williams.

My dear Sir:—I forward herewith a few specimens of seeds, &c. from Ningpo, which I beg you will do me the favor to forward to his Excellency the United States Commissioner, agreeably to the request contained in your letter, which Dr. Macgowan handed me in December last. I am sorry that the quantities are so small, but the lateness of the season made it difficult to procure specimens of seeds; the people being unwilling to spare from their own stock. The proper way is to bespeak seeds beforehand, and have a certain quantity saved from each crop as it is gathered; but this would require nearly a year to make a full collection. I have sent by this opportunity what I have been able to collect, and shall endeavor to make a better collection during the present year. Dr. Macgowan has informed me that he has already sent a collection to the Patent Office, so that the scantiness of the specimens now sent is not a matter of so much importance. The only manure used about Ningpo in any quantity is night-soil or human ordure. Urine is used as a manure for the poppy in the neighboring department of Táichau, where the opium is manufactured called Táichau-tsiang, or Táichau-jelly. Ashes are here used also, but the quantity is not very great. Chicken feathers are collected to be used as a manure for sugar-cane, which is grown in Shanhing-fú, and also in Fanghuia district in this department. Clover is sown and turned under as a green manure for the paddy. I should have mentioned that the sugar-cane is eaten here in substance in the summer, and that no sugar is manufactured from it. Excepting paddy, every thing is planted or sown in drills about ten inches apart, and manured as in a kitchen garden with us. Indian corn, tall millet, and the different kinds of *brassica*, &c., are transplanted after they have attained the height of four or five inches. I subjoin a list of seeds sent.

I remain, very truly yours,

D. B. McCARTEE.

1. Early rice.
2. Late rice.
3. Glutinous rice.
4. Indian corn.
5. Tall millet.
6. Low millet.
7. Wheat.
8. Barley.
9. Buckwheat.
10. Vegetable tallow-tree seeds.
11. Pods of the soap-tree.
12. Cotton seeds.
13. Benne (*sesamum orientale*).
14. Chinese annual hemp.
15. Brinfall, or egg-plant.
16. Pumpkin.
17. Cucumber.
18. Vegetable marrow, (gourd).
19. Tricosanthes, or snake-gourd.

20–26½. Eight species of beans planted about the 5th April, except Nos. 20 and 26, which are planted about January and July respectively.

27. Marigold greens.
28. Mustard seed.
29. Winter coarse greens, planted about Sept. 8th.
30. Winter cabbage, planted Sept. 8th.
31. Bulbous-root cabbage Nov. 8th.
32. Brassica, from the seeds of which oil is made, Nov. 8th.

33–35. Three other specimens from the same family.

Note.—The above seeds have all been distributed from the Patent Office during the present season.

LEGATION OF UNITED STATES,
CANTON, CHINA, *17th Dec.*, 1849.

SIR:—I send you by the American ship "Tzar," that leaves this port to-day for New York, a box of China fruit-seeds directed to you, and also inclose herewith a letter received from Mr. Williams, under whose direction the seeds have been procured and packed.

These seeds will be found best adapted to the Southern portion of the United States.

I have the honor to be very respectfully,
Your obedient servant,
JNO. W. DAVIS.

Hon. THOMAS EWBANK,
Commissioner of Patents, Washington.

CANTON, *Dec. 14th*, 1849.

Hon. J. W. Davis.

SIR:—At your request, I have put up for the Patent Office the following seeds of fruit trees growing in this vicinity; they were gathered during the summer and autumn, and have all been dried in the sun.

OLIVE (*canarium nigrum*).

CUSTARD APPLE (*anona*). This is almost the only exotic fruit growing in China.

PUMELO, three varieties—called the "peck-measure pumelo," from its size—the "mulberry pumelo," and the "foreign pumelo."

LUNG-YEN, or LONGAN (*Dimocarpus longen*).

WHAMPE (*Cookia punctata*).

PERSIMMON (*Diospyros kaki*).

COOLIE ORANGE (*citrus aurantium*).

WATER-MELON.

MUSK-MELON, a small yellow and fragrant sort.

A native fruit called *Ngan-neen*. I do not know its botanical name.

Respectfully yours,
S. WELLS WILLIAMS.

Col. J. Tuley, of Clarke Co., Va., has transmitted to this office samples of choice wheat grown by him; comprising the Etrurian, Zimmerman, and blue-stem varieties. These wheats have been much sought after, and were distributed in small parcels in different sections of the country. Col. T. has been very successful in their cultivation.

Dr. James Higgins, State Agricultural Chemist of Maryland, has forwarded to this office a copy of his first Annual Report, a valuable document, which reflects much credit on Dr. H., as well as on the enlightened policy of the State, in employing a skillful, professional chemist to devote his whole time and talents to the advancement of agriculture, by means of lectures, agricultural surveys, analyses of soils, &c.

There have also been received

The "Report of the Board of Agriculture of the State of Ohio," from M. B. Bateham, Esq., Secretary of the Board.

"Transactions of the Agricultural Societies in the State of Massachusetts," from W. B. Calhoun, Esq., Secretary of the Commonwealth.

"Report of the Rhode Island Society for the Encouragement of Domestic Industry," from E. R. Potter, Esq., of Providence, R. I.

The above reports contain much valuable information to farmers of the different sections of the country; and will be read with interest wherever they are circulated.

The Office is also indebted to C. F. Hagedoon, Esq., Bavarian Consul at Philadelphia, for a valuable collection of vegetable and other seeds from Bavaria, comprising many varieties before unknown, or but little cultivated in this country.

To B. P. Johnson, Esq., Secretary of the New York State Agricultural Society, for Transactions of that Society for the years 1848 and '49, and also for samples of choice wheat, oats, and barley for distribution.

GEORGIA BURR MILL-STONES.

THE fact is worthy of notice, that a siliceous rock, identical in geological position and lithological character with the French burr, abounds in inexhaustible beds in the State of Georgia. From this rock large quantities of millstones are manufactured by a company in Savannah, equal in every respect to the best imported burrs. Specimens of Georgia burr-stone may be seen in the Agricultural Room of the Patent Office.

BICKÈS'S CHEMICAL AZOTIC POWDER.

WE have received, through the politeness of William H. Robertson, Esq. (whose letter is given below), a package containing specimens of a newly discovered preparation which has caused considerable sensation in France, called "Bickès's Chemical Azotic Powder." Mr. R. writes as follows:

NEW YORK, *May* 10, 1850.

Hon. Thos. Ewbank.

SIR:—I have this day taken the liberty to send you a package which I brought with me from Paris, containing "Bickès's Process of Cultivation without Manure."

The sensation created by this process has been extraordinary under my own eye; and from what I have witnessed, I have been induced to procure from him (M. Bickès) the accompanying preparation, that if it has merit, our country may benefit by it. Your Office being the proper channel for its distribution, I send it to you for that purpose, recommending that it should be tried upon poor and exhausted land.

I have myself seen the largest stalks of wheat, the largest stems, shoots, and heads I ever saw, said to have been grown in moveable sand. With the package is the mode of application.

I am, with great respect, your ob't servant,
WILLIAM H. ROBERTSON.

From a cursory glance through the pamphlet accompanying the preparation forwarded by Mr. R., it would appear that the inventor, M. Bickès,

after a long and careful study of vegetable physiology, became convinced that the growth of plants is mainly dependent upon the organs of absorption and assimilation, and that these being located in that portion of the plant above the ground, the great desideratum was to discover some cheap, chemical compound, which would stimulate their development.

This compound he thinks he has discovered in the form of what he calls an *azotic powder.*

The advantages which he claims for his new system are as follow:

1st. A general adaptation to all soils and plants, whether the last be of field or garden culture.

2d. A superior yield to the ordinary process, with half the seed.

3d. Greater economy—the cost of the manure being only $2.00 per acre.

4th. Vegetation being so rapid as to enable the farmer, with certain plants, to make two crops in a season where before he grew but one.

5th. Increased size of fruit.

6th. Flavor of fruit improved, and perfume of flowers increased.

7th. Remedy for disease in plants.

8th. Fallow dispensed with.

9th. Immediate profitable yield from the most sterile land.

The mode of application is to add to the powder sufficient warm water to form a paste; and then to mix the seed thoroughly with this before sowing.

These specimens have been submitted to persons eminently capable of testing their merits; and the results of their experiments will hereafter be given to the public.

SAMPLES OF BEAUTIFUL COTTON.

MEMPHIS, *November 20th*, 1849.

I forward you four samples of the most popular varieties of cotton in our section of country, with labels annexed of the names of the planters by whom they are cultivated; being specimens of the kinds alluded to in the communication addressed to you, a few days since, by Dr. Samuel Bond and myself.

We would be pleased, if you would submit the samples to the inspection of a good manufacturing gentleman, who may happen to visit your city from the North, for an expression of his opinion of the *staple* of the different samples, and learn if any specific objection is expressed to the staple of the mastodon sample. I would particularly suggest, that the *scrutiny* should be made by gentlemen *practically* informed in the manufacture of cotton fabrics.

Yours, very respectfully,

JOHN P. POPE.

Hon. THOMAS EWBANK,
Commissioner of Patents.

(The samples of cotton received with the above note, have been shown to a number of gentlemen qualified to judge of the merits of this important staple, who expressed very favorable opinions. Nor have we heard any criticism worth repeating. The cotton is naturally excellent, and it has been handled in the best manner. Vast sums of money are annually lost by negligence in gathering, ginning, packing, and transporting cotton to distant markets.)

The high value which farmers in all parts of the country set upon the Reports issued from the Patent Office, will be seen from the following extract from a letter of Mr. J. P. Rounseville, of Allegheny Co., N. Y.

"Through the kindness of Hon. David Rumsey, M. C., I received the Patent Office Report for 1847, and read it with the greatest pleasure. I inquired at the bookstores in this county for the Report of previous years, and only found that of 1845.

"A few days since, Mr. R. sent me the Report for 1848, so that now I have three, '45, '47 and '48. I can scarcely estimate the value of these three books to me and my neighbors in farming. They were the first books on farming that I had ever read; for I did not think I needed any *book knowledge* on this subject.

"I have since obtained the State Agricultural Transactions for 1847–48. After reading what other farmers have done, and what improvements have been made, I see the defects in our system in practice here; and, anxious to obtain further information, so that we may be able to remedy them, my neighbors are as desirous as myself to read and profit by these books; and I think it the duty of those who are so fortunate as to receive them, to lend them to such farmers as will be benefited by reading them.

"The value of the agricultural products of this county is about $200,000 yearly; and I estimate that 2 per cent. has been added to this amount in 1849, and 3 per cent. will be added in 1850, amounting to from $4000 to $6000 a year; from the information derived from the 40 or 50 copies of the Patent Office Report distributed among our farmers.

"I have looked the subject over carefully, and I do not think my estimate too high. This benefit, too, is not a mere transient one, like a load of manure on land, that will soon wear out, but perpetual. If there is any thing which I can do here, or any information which I can send, that will increase the usefulness of your office, and in part repay the benefits I have derived from your Reports, I shall esteem it a privilege to do it."

VII.

ANALYTICAL TABLES.

PROXIMATE ORGANIC ANALYSIS OF FIVE VARIETIES OF RIPE MAIZE OR INDIAN CORN.

(BY J. H. SALISBURY, M. D., ALBANY, N. Y.)

Proportions.

1. Golden Sioux corn, 100.00 grs. gave:

Water	15.02
Dry	84.98

2. Large 8-rowed yellow corn, 100 grs. gave:

Water	14.00
Dry	86.00

3. Small 8-rowed yellow corn, 100 grs. gave:

Water	14.03
Dry	85.97

4. White flint corn, 100 grs. gave:

Water	14.00
Dry	86.00

5. Ohio dent corn, 100 grs. gave:

Water	14.50
Dry	85.50

1. Proximate analysis of the Golden Sioux corn. A bright yellow 12-rowed variety, passing into 14 rows; frequently 14 rows at the base of the ear. It may perhaps be regarded as an improved variety of Buel's Dutton corn, as it ripens earlier, and I believe has a smaller kernel:

Starch	36.06
Gluten	5.00
Oil	3.44
Albumen	4.42
Casein	1.92
Dextrine	1.80
Fibre	18.50
Sugar and extractive matter	7.25
Water	15.02
	100.05

2. Organic analysis of the Ohio dent corn, one of the largest varieties of maize:

Starch	41.85
Gluten	4.62
Oil	3.88
Albumen	2.64
Casein	1.82
Dextrine	5.40
Fibre	21.86
Sugar and extract	10.00
Water	10.00
	101.07

3. Organic analysis of the small 8-rowed corn:

Starch	30.290
Gluten	5.600
Oil	3.900
Albumen	6.000
Casein	2.200
Dextrine	4.615
Fibre	26.800
Sugar and extract	5.200
Water	13.400
	98.005

4. Analysis of white flint corn. Grown upon a clay loam, and manured in the hill, with a mixture of coal, ashes, and horse-dung, and ashed with unleached ashes twice:

Starch	40.34
Gluten	7.69
Oil	4.68
Albumen	3.40
Casein	0.50
Dextrine	2.90
Sugar and extractive matter	8.30
Water	14.00
Fibre	18.01
	99.72

The water has been determined from the ground grain, and some oil has been found upon the paper enveloping its contents: probably the water may be stated too high by 1 per cent.

5. Organic analysis of the larger variety of 8-rowed yellow corn:

Starch	49.22
Gluten	5.40
Albumen	3.32
Oil	3.71
Casein	0.75
Fibre	11.96
Dextrine	1.89
Sugar and extract	9.55
Water	14.00
	99.80

The amount of starch in this variety was unexpected, and a small part may be set down as adherent albumen.

Additional Analysis of White Flint Corn.

1. Analysis of the kernels of white flint corn, cut August 22d. Sown upon the same soil as the small 8-rowed yellow, a sandy loam, and manured in part with coal ashes:

Silica	9.500
Alkaline and earthy phosphates	35.500
Lime	0.160
Magnesia	2.410
Potash	23.920
Soda	22.590
Chlorine	0.405
Sulphuric acid	4.385
Organic matter	0.367
	99.237

2. Analysis of the leaves of the white flint corn, cut August 22d:

Silica	53.550
Earthy phosphates	19.250
Lime	6.092
Magnesia	1.250
Potash	12.762
Soda	8.512
Chlorine	9.762
Sulphuric acid	4.185
	101.371

3. Analysis of the cob of white flint:

Silica	18.600
Earthy phosphates	23.924
Lime	0.300
Magnesia	0.900
Potash	35.802
Soda	5.914
Chlorine	0.132
Sulphuric acid	0.345
Organic matter	2.314
Carbonic acid	6.134
	89.365

In each of the foregoing results, the quantity of silica is greater than in the 8-rowed yellow corn growing beside it and treated in the same way. The ash, in its physical properties, appeared more siliceous than it usually is, and hence I have no doubt the analyses are correct. It goes to show that the same plant may take up and assimilate a greater amount of inorganic matter under some circumstances than in others. This corn, besides being supplied with manure of the horse, mixed with coal ashes in the hill, was ashed with unleached ashes. The consequence was that the crop gave a remarkably sound, hard grain. It would seem that this treatment had some share in producing the excess of silica obtained in the foregoing analyses.

Analyses of the Parts belonging to Broom-Corn.

1. Analysis of the stalks:

		Removed from the soil in a ton of Stalks.
Silex	6.24	1.828 lbs.
Earthy phosphates	16.66	4.881
Lime	6.25	1.831
Magnesia	3.74	1.095
Potash	30.40	8.907
Soda	15.46	4.529
Sulphuric acid	9.07	2.657
Chlorine	2.14	0.627
Peroxide of iron	2.61	0.764
Organic matter and magnesia	6.24	1.828
	98.81	28.947

2. Analysis of the sheaths of the broom-corn:

		Removed in a ton.
Silica	40.20	28.903 lbs.
Earthy phosphates	15.00	10.785
Lime	3.00	2.157
Magnesia	3.24	2.329
Potash	26.56	19.096
Soda	7.33	5.270
Sulphuric acid	3.57	2.566
Chlorine	1.72	1.236
	100.62	72.342

3. Analysis of the ripe broom-corn brush, with the seeds:

		Removed from the soil in a ton of Brush and Seeds.
Silex	32.50	11.960 lbs.
Earthy phosphates	36.15	13.303
Lime	0.40	0.147
Magnesia	0.10	0.036
Potash	27.32	10.053
Soda	2.37	0.870
Chlorine	2.50	0.846
Sulphuric acid	undetermined	
	101.14	37.215

4. Composition of the ash of broom-corn seed:

Carbonic acid	not determined
Silicic acid	41.975
Sulphuric acid	not determined
Phosphoric acid	28.760
Phosphate of peroxide of iron	0.525
Lime	0.845
Magnesia	3.010
Potash	3.920
Soda	7.247
Chlorine	0.245
Organic acids	4.200
	90.727

Proportions.

Water	12.22
Dry matter	87.78
Ash	3.00
Per centage of ash calculated on the dry matter	3.417

Analysis of Buckwheat.

In its classification as a plant, buckwheat belongs to a family far removed from the cereals; but in the composition and properties of its seed, it approximates to them closely, and hence it is placed here. A few analyses only have been made of it. The two following will show the composition of the ash of the seed. They also show, in the amount of earthy phosphates and phosphoric acid, a remarkable similarity to the grains of the cereals. Its specific gravity is 1.081.

Silica	7.06
Earthy phosphates	57.60
Lime	0.14
Magnesia	2.66
Potash	23.33
Soda	2.04
Sulphuric acid	7.30
Chlorine	0.20
	100.23

The amount of silica may have been increased from want of attention to the foreign matter upon the seed; its well known grittiness, when not removed by a mill, renders the supposition probable.

Composition of the Ash of Buckwheat.

		Removed in every 10 bushels of seed.
Carbonic acid	trace	
Silicic acid	1.95	0.245
Sulphuric acid	1.55	0.195
Phosphoric acid	49.85	6.281
Lime	3.01	0.379
Magnesia	15.84	1.995
Potash	21.27	2.680
Soda	2.32	0.292
Chlorine	0.30	0.037
Organic acids	2.75	0.346
	98.84	12.450

Proportions.

Water	12.875
Dry matter	87.125
Ash	3.600
Ash calculated on the dry matter	4.132

Proximate organic Analysis of Buckwheat.

Starch	42.47
Sugar and extractive matter	6.16
Dextrine or gum	1.60
Epidermis	14.42
A light gray matter taken up by a weak solution of caustic potash from the bodies insoluble in water and boiling alcohol	10.10
Albumen	6.70
Casein	0.78
Matter dissolved out of the bodies insoluble in water, by boiling alcohol; rising with a substance analogous to water	2.66
Oil	0.47
Water	12.88
	98.24

Analysis of Fruit Trees.

(BY PROF. EMMONS, ALBANY, N. Y.)

Pear Tree.

	Sap Wood.	Heart Wood.	Bark of the Trunk.
Water	48.80	22.05	68.70
Dry	37.20	77.95	30.30
Ash	0.20	0.10	1.99

Root of the Pear Tree.

	Wood.	Bark.
Water	22.33	58.80
Dry	79.67	46.20
Ash	0.40	3.26

The wood of the pear gives 9.79 per centum of charcoal. The wood of the pear is soft, close-grained, and easily wrought, and hence is sometimes substituted for box in large wood engravings.

Sweet Apple Tree.

	Sap Wood.	Heart Wood.	Bark of the Trunk.
Water	39.10	33.35	59.00
Dry	60.90	66.65	41.00
Ash	0.35	0.16	4.55

Sugar Maple.—(*Acer saccharinum.*)

Tree sound. Diameter three feet from the ground, 28 inches; do. 12 feet from the ground, 21½ inches. From the base to the limbs, 62 feet. Whole length of the tree, 107 feet. Average thickness of the bark, ¾ inch. Age, 224 years. At twelve feet from the base, the 100 outside layers were taken for outside wood, making a thickness of 4⅝ inches; the remaining layers were taken for inside wood. Growth very uniform. Average thickness of each layer, 0.04464 of an inch.

	Bark.	Outside Wood.	Heart Wood.
Potash	0.88	8.77	4.21
Soda	7.76	0.964	
Chloride of sodium	0.08		0.08
Sulphuric acid	1.497	1.171	1.03
Carbonic acid	37.12	37.247	33.33
Lime	49.88	31.86	43.14
Magnesia	3.64	8.40	7.24
Phosphate of peroxide of iron	0.32	0.76	1.34
Phosphate of lime	3.13	5.70	5.09
Phosphate of magnesia	0.02	1.80	0.22
Organic matter	1.50	2.40	1.93
Insoluble silica	0.15	0.50	0.55
	105.417	100.512	98.16

HICKORY.—(*Carya alba.*)

The wood has been seasoned during one summer and fall, and grew in the valley of the Mohawk.

	Outside Sap Wood.	Inside Sap Wood.	Heart Wood.	Bark.
Potash	7.472	20.187	12.210	2.340
Soda	0.084	0.085	0.055	0.125
Chlorine	0.096	0.085	0.065	0.145
Sulphuric acid	0.892	4.640	5.260	1.925
Phosphate of peroxide of iron, Phosphate of lime, Phosphate of magnesia	14.440	11.450	6.340	5.000
Carbonic acid	29.576	21.405	33.630	33.995
Lime	38.264	27.695	43.520	51.106
Magnesia	6.200	8.600	4.000	0.820
Silica	4.200	6.150	1.300	4.550
Soluble silica	0.280	0.010	trace	0.250
Organic matter	undetermined.			
	101.504	100.331	105.390	100.255

WHITE OAK.—(*Quercus alba.*)

Ash obtained from the Green Wood.

	Sap Wood.	Heart Wood.	Wood of Twigs.	Bark of Trunk.	Bark of Twigs.
Potash	13.41	9.68	9.74	0.25	1.27
Soda	0.52	5.03	6.89	2.57	4.05
Sodium	2.78	0.89	0.16	0.08	0.08
Chlorine	4.24	0.47	0.25	0.12	0.13
Sulphuric acid	0.12	0.26	0.08	0.08	trace
Phosphate of peroxide of iron, Phosphate of lime, Phosphate of magnesia	32.25	13.30	23.60	10.10	14.15
Carbonic acid	8.95	19.29	17.55	29.80	30.83
Lime	30.85	43.21	34.10	54.89	47.72
Magnesia	0.36	0.25	0.60	0.20	0.20
Silica	0.21	0.88	0.55	0.25	0.65
Soluble silica	0.80	0.30	0.60	0.25	0.65
Organic matter	5.70	7.10	5.90	1.16	1.62
	100.18	100.06	99.99	100.05	100.00

The oak grew in the immediate neighborhood of Albany, upon a stiff clay, known as the Albany clay.

SWAMP WHITE OAK.—(*Quercus bicolor.*)

	Bark.	Outside Wood.	Inside Wood.
Potash	0.459	20.49	14.79
Soda	trace	3.15	3.69
Chloride of sodium			
Sulphuric acid	0.295		
Carbonic acid	40.335	32.919	34.61
Lime	52.26	30.23	35.87
Magnesia	0.25	0.50	0.51
Phosphates	3.50	5.20	6.30
Organic matter	2.13	....	2.70
Silica	2.00	1.50	0.50
Coal	2.50	4.00	1.60
Moisture	....	....	2.60
	103.729	97.999	103.17

WHITE ELM.—(*Ulmus Americana.*)

Tree sound. Diameter three feet from the base, 28 inches; ditto fourteen feet from the base, 25½ inches. Mean thickness of the bark, ¾ inch. Whole length of the tree, 111 feet. Number of layers fourteen feet from the base, 208. Average thickness of each layer, 0.05769 of an inch. Thickness of layers quite uniform. From 80 to 85 outside layers taken for outside wood, the remaining layers for inside wood.

	Bark of Trunk.	Outside Wood.	Bark of Twigs.	Wood of Twigs.
Potash	3.79	....	5.82	9.61
Soda	1.65	....	6.53	18.41
Chloride of sodium	trace	....	0.07	
Sulphuric acid	0.14	12.02	2.80	3.98
Carbonic acid	39.44	....	24.72	26.07
Lime	27.46	....	16.92	14.77
Magnesia	13.10	....	3.00	2.40
Phosphate of peroxide of iron, Phosphate of lime, Phosphate of magnesia	3.40	....	24.50	22.85
Organic matter	2.00	....	1.50	
Insoluble silica	1.75	....	....	0.50
Coal	....	....	....	0.30
Moisture	3.10			
	85.86	12.02	95.82	97.49

CHESTNUT.—(*Castanea vesca.*)

	Bark.	Outside Wood.	Inside Wood.
Potash	1.86	4.56	2.73
Soda	0.319	1.41	1.98
Chloride of sodium	trace		
Sulphuric acid	0.312	0.50	
Carbonic acid	39.90	28.842	29.52
Lime	51.60	40.76	38.20
Magnesia	0.60	5.77	0.513
Phosphate of peroxide of iron	0.20	1.30	0.30
Phosphate of lime	2.90	17.44	8.60
Phosphate of magnesia			
Organic matter	5.00	1.74	3.20
Silica	1.20	1.48	1.71
Coal	1.00	0.914	1.76
Moisture	3.00	......	2.13
	107.891	99.666	90.143

RED BEECH.—(*Fagus ferruginea.*)

Tree a little hollow at the base. Diameter three feet from the ground, 28 inches; fourteen feet from the ground, 22 inches—sound. Average thickness of the bark, ½ inch. Section for analysis taken fourteen feet from the ground. Age, 240 years. Growth, quite uniform. Average thickness of each layer, 0.0453 of an inch. Between 60 and 65 outside layers taken for outside wood; the remaining layers for inside wood.

	Bark.	Outside Wood.	Heart Wood.	Bark of Twigs.	Wood of Twigs.
Potash	0.18	12.18	4.04	0.68	11.00
Soda	....	15.68	25.58	4.68	11.79
Chloride of sodium	....	0.05	0.24	0.14	0.16
Sulphuric acid	....	0.47	0.62	4.54	14.68
Carbonic acid	40.41	24.39	24.59	18.18	1.79
Lime	52.29	31.56	81.82	23.52	2.81
Magnesia	0.32	5.44	1.44	3.41	6.08
Phosphate of lime	....	17.23	22.04	18.80	35.60
Phosphate of peroxide of iron	1.96	0.85	0.40	0.41	0.80
Phosphate of magnesia	....	0.93	0.02	0.10	10.89
Organic matter	....	1.80	2.80	3.01	10.50
Insoluble silica	3.30	1.45	1.60	29.00	0.92
Coal	1.50	....	....	....	0.31
	99.91	111.99	115.14	106.46	106.83

BASS WOOD.—(*Tilia Americana.*)

Tree sound. Mean diameter four feet from the ground, 22 inches. Average thickness of the bark, 1 inch. Age, 182 years. About 60 of the outside layers were taken for outside wood. Thickness, 4½ inches. The remaining layers taken for inside wood. Growth uniform. Average thickness of each layer, 0.0549 of an inch.

	Bark.	Outside Bark.	Heart Wood.	Bark of Twigs.	Wood of Twigs.
Potash	1.26	19.12	4.05	1.90	14.55
Soda	12.77	2.88	10.41	9.14	
Chloride of sodium	0.24	0.50	0.52	0.15	0.10
Sulphuric acid	0.72	0.88	0.27	4.19	18.34
Carbonic acid	25.38	16.64	17.96	22.84	3.94
Lime	41.92	38.36	45.24	29.56	11.56
Magnesia	2.24	7.36	7.44	3.00	7.44
Phosphate of peroxide of iron	0.20	1.20	1.30	0.81	0.60
Phosphate of lime	8.50	17.95	8.96	24.77	38.92
Phosphate of magnesia	0.30	2.60	0.04	0.72	1.28
Organic matter	1.70	2.58	2.00	2.40	9.61
Insoluble silica	4.60	2.10	1.40	0.40	0.10
Coal	....	....	0.80		
	99.83	103.12	99.59	100.18	101.44

BUTTERNUT.—(*Juglans cinerea.*)

Tree sound. Diameter three feet from the ground, 2 feet 8 inches; eleven feet from the ground, 1 foot 8 inches. The section for analysis was taken eleven feet from the ground. Average thickness of the bark, ¼ inch. Age, 146 years. Between 65 and 70 outside layers were taken for outside wood; thickness, 4½ inches; the remaining inside layers taken for inside wood. Growth of tree more rapid when young.

	Bark.	Outside Wood.	Heart Wood.	Bark of Twigs.	Wood of Twigs.
Potash	1.00	4.42	1.00	0.68	8.28
Soda	11.27	5.61	14.82	11.24	14.59
Chloride of sodium	0.15	0.16	0.18	0.03	0.03
Sulphuric acid	0.74	18.83	21.48	5.33	5.86
Carbonic acid	32.12	20.02	4.48	18.92	7.02
Lime	37.68	38.98	42.02	24.48	9.08
Magnesia	10.08	3.52	4.00	2.22	5.84
Phosphate of peroxide of iron	0.30	3.40	3.41	0.41	0.50
Phosphate of lime	2.25	2.20	0.59	29.25	40.39
Phosphate of magnesia	0.15	0.06	0.28	1.04	1.61
Organic matter	2.80	3.40	3.20	4.41	5.20
Insoluble silica	0.30	4.80	5.40	0.40	0.32
Coal	....	....	....	0.80	1.21
Water	....	....	....	....	3.41
	98.84	100.20	100.76	99.16	97.84

IRON WOOD.—(*Ostrya Virginica.*)

	Sap Wood.	Heart Wood.	Wood of Twigs.	Bark of Trunk.	Bark of Twigs.
Potash	1.581	14.549	20.76	0.696	2.78
Soda	0.025	0.086	2.07	0.023	0.405
Chlorine	0.049	0.098	0.25	0.04	0.15
Sulphuric acid	0.086	0.378	0.64	0.086	0.52
Phosphate of peroxide of iron					
Phosphate of lime	5.65	23.10	35.4	5.10	10.55
Phosphate of magnesia					
Carbonic acid	36.159	20.139	12.22	33.858	33.975
Lime	48.791	27.461	20.98	57.932	48.225
Magnesia	4.20	4.40	5.6	1.20	1.00
Silica	0.20	0.40	0.4	0.25	2.30
Soluble silica	....	....	....	0.276	
Organic matter	2.853	undetermined			
	99.577	90.611	99.21	99.456	99.905

FRUIT TREES.

PEACH.—(*Amygdala Persica.*)

Small seedling peach. Age of the tree, 23 years. Mean diameter, 3½ inches. Thickness of bark, ¼ inch. Growth, rather slow. Average thickness of each layer, 0.0699 of an inch.

	Bark of Trunk.	Wood of Trunk.	Bark of Root.	Wood of Root.	Leaves.	Pits.*	Bark of Limbs.†	Wood of Limbs.†
Potash	1.20	7.11	3.162	8.58	12.41	18.47	8.85	19.21
Soda		11.15	1.92	15.92	.....	5.21	.....	8.11
Chloride of sodium	0.04	0.16	0.88	5.60	.....	2.70	0.28	0.24
Chloride of potassium	.....	.....	....	.....	0.86			
Sulphuric acid	4.19	1.51	3.44	0.58	12.12	15.12	6.18	8.07
Carbonic acid								
Lime	42.17	23.26	38.48	0.11	14.77	16.80	31.98	24.64
Magnesia	2.16	6.40	2.91	0.01	8.00	1.38	6.00	9.76
Phosphate perox. iron	0.45	0.32	10.40	1.02	2.47	1.38	1.60	0.60
Phosphate lime	18.79	29.19		18.10	10.44	17.98	8.50	13.20
Phosphate magnesia	0.01	1.84	......	30.00	3.15	0.02	0.20	0.20
Organic matter	3.30	5.20	3.60	2.55	0.86	6.61	5.00	8.40
Insoluble silica	4.15	1.35	9.40	6.46	6.42	10.00	4.30	1.00
Coal	.....	.....	1.40	......	4.48	.....	1.00	1.20
	109.04	104.97	104.562	89.02	86.85	128.77	99.08	104.99

* Analysis made with two grains of ash. † Peach limbs half an inch in diameter.

Leaves of the peach tree, July 22:

Carbonic acid	13.300
Silicic acid	0.600
Phosphates	9.600
Lime	16.220
Magnesia	5.900
Potash	14.280
Soda	21.220
Chlorine	5.120
Sulphuric acid	4.420
Organic acids	7.900
	98.560

Leaves affected with *the yellows*:

Carbonic acid	13.200
Silicic acid	0.800
Sulphuric acid	4.430
Phosphates	11.600
Lime	14.800
Magnesia	5.300
Potash	14.440
Soda	22.280
Chlorine	4.740
Organic acids	4.300
	99.890

PLUM.—(*Prunus domestica.*)

Tree cut first of May.

	Proportions.			
	Bark of Root.	Wood of Root.	Bark of Limbs.	Wood of Limbs.
Per centage water	48.51	44.64	27.50	20.23
Per centage dry wood	51.49	55.36	72.50	79.67
Per centage ash	3.12	0.24	4.37	0.38

	Analysis.				
	Plum Pits.*	Bark of Root.	Wood of Root.	Bark of Limbs.	Wood of Limbs.
Potash	13.92	9.86	40.81	8.59	11.63
Soda	10.08	6.63		19.49	
Chloride of sodium	2.25	4.22	0.103	1.08	0.18
Sulphuric acid	6.11	5.22	4.64	4.09	20.34
Carbonic acid					
Lime	23.30	22.74	0.17	39.42	8.12
Magnesia	4.80	0.96	0.20	3.76	6.56
Phosphate of peroxide of iron		6.90	1.20	2.80	0.60
Phosphate of lime	8.00	7.62	31.98	7.50	24.99
Phosphate of magnesia		8.28	17.12	trace	1.16
Organic matter	6.65	1.76	2.50	1.40	4.60
Insoluble silica	27.20	21.40	1.80	8.40	0.70
Coal	......	3.60	0.90	......	1.60
	102.81	94.21	100.923	95.98	80.53

* This analysis was made with two grains of ash.

APPLE.—(*Pyrus malus.*)

Sweet apple; age of the tree, 19 years; diameter of section taken for analysis, 6 inches; thickness of the bark, ¼ inch; average thickness of each layer, 0.1443 of an inch.

	Bark.	Outside Wood.	Heart Wood.	Bark of Root.	Wood of Root.
Potash	0.44	3.288	2.75	0.66	15.07
Soda	1.58	3.88	1.62	11.88	21.99
Chloride of sodium	0.80	0.83	0.51	0.10	0.11
Sulphuric acid	38.39	12.21	22.17	30.83	1.84
Carbonic acid	49.56	15.79	38.98		
Lime	1.86	15.56	2.66	1.00	11.64
Magnesia	2.56	3.52	2.93	8.72	0.16
Phosphate of peroxide of iron				0.72	0.91
Phosphate of lime	3.60	37.50	24.40	6.89	13.96
Phosphate of magnesia				......	31.85
Organic matter	3.85	3.20	3.60	1.80	1.20
Insoluble silica	1.26	0.45	0.20	2.86	1.46
Coal	1.26	0.85	0.01	0.72	
	104.21	95.528	99.83	65.18	98.69

ROSE TREE.

	Bark.	Wood.
Potash	5.12	11.60
Soda	8.52	5.99
Chloride of sodium	3.20	3.00
Sulphuric acid	5.00	6.00
Carbonic acid	28.79	15.87
Lime	22.56	10.46
Magnesia	2.86	3.80
Phosphate of iron	15.30	31.00
Organic matter	1.60	
Silica	3.30	3.00
Coal	2.40	2.30
Moisture	1.00	0.50
	2.00	1.00

Leaves of the Pear Tree, picked May 23. Flowers just fallen:

Carbonic acid	11.560
Silicic acid	1.750
Phosphates	25.050
Lime	4.715
Magnesia	4.500
Potash	18.950
Soda	15.190
Sulphuric acid, chlorine, and organic acids not determined.	
	81.715

Leaves of the Early Harvest Apple, collected Sept. 30. Bearing fruit:

Silica		5.775
Earthy Phosphates—		
Phosphate of peroxide of iron	4.875	
Phosphate of lime	1.416	
Phosphate of magnesia	trace	
Silica	5.125	
Phosphoric acid	5.359	
		16.775
Lime		36.398
Magnesia		0.075
Potash		13.179
Soda		11.616
Chloride of sodium		0.060
Sulphuric acid		0.137
Carbonic acid		15.200
Organic matter		2.850
		101.065

Proportions.

Water	54.341
Dry	45.659
Ash	4.194
Calculated dry	9.163

Leaves of the Bergamot Pear, collected Sept. 30. Bearing fruit:

Silica		4.250
Earthy phosphates—		
Phosphate of peroxide of iron	4.600	
Phosphate of lime	7.559	
Phosphate of magnesia	0.660	
Silica	0.450	
Phosphoric acid	3.781	
		16.550
Lime		39.853
Magnesia		5.920
Potash		8.793
Soda		
Chlorine		0.554
Sulphuric acid		4.464
Carbonic acid		17.125
Organic matter		3.000
		100.509

Proportions.

Water	56.138
Dry	43.862
Ash	3.260
Calculated dry	7.514

Leaves of the Ox-heart Cherry, picked May 23. Flowers just fallen:

Carbonic acid	11.450
Silicic acid	1.850
Phosphates	26.650
Lime	3.941
Magnesia	3.465
Potash	23.757
Soda	12.365
Sulphuric acid, chlorine, and organic acids not determined.	
	83.478

Leaves of the Large Yellow Spanish Cherry, collected September 30:

Silica	4.225
Phosphates	37.175
Lime	21.957
Magnesia	3.195
Potash	13.948
Soda	1.657
Chloride of sodium	0.410
Sulphuric acid	10.260
Organic matter	7.650
	100.577

Proportions.

Water	58.628
Dry	41.372
Ash	3.434
Calculated dry	8.300

Leaves of the Catawba Grape, collected Sept. 30. Fruit abundant:

Silica		23.150
Earthy phosphates—		
Phosphate of iron	6.750	
Phosphate of lime	11.648	
Phosphate of magnesia	0.150	
Silica	4.050	
Phosphoric acid	6.152	
		28.750
Lime		26,258
Magnesia		5.330
Potash		1.710
Soda		2.983
Chloride of sodium		0.305
Sulphuric acid		1.426
Carbonic acid		8.900
Organic matter		3.450
		102.262

Proportions.

Water	11.169
Dry	28.831
Ash	2.282
Calculated dry	7.915

Leaves of the Catawba Grape, picked June 2, nearly full grown:

Carbonic acid	3.050
Silicic acid	29.650
Sulphuric acid	2.062
Phosphates	32.950
Lime	4.391
Magnesia	1.740
Potash	13.394
Soda	9.698
Chlorine	0.741
Organic acids	2.250
	99.926

FRUIT OF THE BLACK WALNUT.

	Rind.	Shell.	Meat.
Silica	1.85	0.40	1.86
Earthy phosphates	15.60	18.50	40.96
Carbonate of lime	23.75	5.60	0.10
Magnesia	1.55	0.10	trace.
Potash	41.43	47.00	22.99
Soda	7.12	10.21	4.98
Sulphuric acid	2.65	9.84	11.05
Chlorine	1.60	2.15	trace.
Organic matter	1.30	5.40	5.00
Alkaline phosphates			9.10
	96.85	99.20	96.02

CURRANT LEAVES AND FLOWERS.

Two hundred grains of the leaves gave 4.00 grains of ash, and the same weight of the flowers gave 2.95 of ash, but the analysis was not finished. The leaves are particularly rich in soda and the phosphates. The analysis of the flower was undertaken for the purpose of determining the amount of silica, an element which I have found rather abundant in floral organs, particularly the petals. In the ash of the blossom of the currant I have found 9 per centum of silica and 28 per centum of potash, a result which indicates the predominance of potash rather than soda in these organs.

THE BEST TIME FOR CUTTING TIMBER, ETC.

Experience has proved that trees for timber, if cut at one season of the year, are far more durable than if cut at another. Various reasons have been suggested why this is so, and it is not perhaps yet fully determined; still, as the time which experience has pointed out, as the best for durability, is during the autumn, it is generally supposed that this property is modified by the amount of sap in the trunk, and the maturity of the wood itself. In the spring, or at any earlier period of it, the trunk of most trees is pressed with the ascending sap. The leaves as yet are still folden in the bud, and the surfaces for exhalation are only sufficient to carry off very slowly the watery part of the sap. Even after the leaves have expanded, or until mid-summer has arrived, the tree abounds in juices. When, however, the dry and sultry summer has arrived, and the new wood and buds have been matured and formed, the watery part of the sap is mostly exhaled, and probably, too, the circulation is less active as the leaves become sere.

It is stated by Mr. Emerson, author of the valuable report on the trees and shrubs of Massachusetts, that the soft maple cut in September, is three times more lasting than ash or walnut cut in the winter; and, from numerous inquiries which he has made in various quarters, and from information obtained from reliable sources, it seems he has established the fact that autumn is the time for cutting timber. When it is determined to cut timber, it is of considerable importance to strip off the bark in the spring, that the body of the tree may dry during the summer. When, however, it is an object to re-produce a forest from the remaining stumps, then winter, or the very first of spring, is much more favorable to the growth of sprouts.

There are, then, two seasons for cutting wood: if it is expected to last, it must be cut the last of summer, or during the early part of autumn; if it is wished to clothe the surface with a new growth of trees, the cutting must be made late in winter.

It is, however, possible to modify these arrangements: if, for example, the wood is designed for timber, if it is deprived of its bark in the spring, it may be allowed to stand and season till winter arrives, which is a period when farmers have less to do than in the summer or autumn.

In seasoning, wood retains an amount of water which may be regarded as its constitutional supply. This constitutional water is very important; for upon its presence some of the most valuable properties of the wood depend. I refer to elasticity and strength. If wood, for example, is dried in a water bath at 212° till it ceases to lose weight, its elasticity and strength is very much diminished. Hickory, when dried in this way becomes as brittle as pine. In ordinary seasoning, or in steaming, I believe the strength of wood is not diminished. This observation may not be of much practical importance, as this last plan of seasoning is rarely followed. The amount of water varies, as will be observed, in different species of trees, as well as in herbaceous plants.

In another point of view, the amount of water is important to be known, for the difference between taking green and dry wood to market, as well as in consuming, is very great; and so also, as ample experience proves, there is a material difference in burning green and dry wood. The quantity of

water in the wood varies from 20 to 50 per centum, and probably the average amount will not differ from 35 to 40 per centum. This water is not only of no use to the fire-wood, but it is prejudicial, as it must be dissipated by heat, in which act heat or caloric becomes latent and lost, especially if the wood is consumed upon a hearth or in a stove.

In addition to the effect of water in diminishing the combustibility of wood, the alkalies have also considerable influence of this kind. Elm, which is a potash wood, burns with less freedom than hickory, which contains much lime.

It is, however, possible that the size of the pores of wood may modify its combustibility. Black oak is a notable instance of a slow and drizzling combustion; the pores are large and numerous, from which the watery sap continually oozes.

ANALYSIS OF CLOVER.

BY PROF. WAY.

The following tables exhibit the composition of the ash of red and white clover hay. The specimens of clover were dried in the air until they attained the condition of ordinary new-made hay. In this state they still retained a considerable proportion of water, as is seen in the following table:—

Percentage of Water and Ash in four specimens of Clover Hay.

	Red Clover.		White Clover.	
	Silicious Sand.	Clay.	Silicious Sand.	Clay.
Water	13.97	12.20	12.60	12.00
Ash	6.77	7.12	7.70	7.61
Ash calculated on the dry	7.87	8.11	8.81	8.65

Composition of 100 parts of the Ash of Red and White Clover Hay.

	Red Clover.		White Clover.		Mean of Analyses.	
	Silicious Sand.	Clay.	Silicious Sand.	Clay.	Red Clover.	White Clover.
Silica	4.08	2.66	4.63	2.74	3.84	3.68
Phosphoric acid	5.82	6.88	10.93	12.12	6.85	11.53
Sulphuric acid	8.91	4.46	7.05	7.38	4.18	7.21
Carbonic acid	12.92	20.94	18.64	17.41	16.98	18.03
Lime	35.02	35.76	26.32	26.51	35.39	26.41
Magnesia	11.91	10.53	7.46	8.83	11.22	8.15
Peroxide of iron	0.98	0.95	1.17	2.76	0.97	1.96
Potash	18.44	11.30	15.17	13.50	14.85	14.33
Soda	2.79	....	3.03	4.41	1.40	3.72
Chloride of sodium	4.18	0.58	5.56	4.82	2.36	4.94
Chloride of potassium	....	5.92	....	....	2.96	
Total	99.95	99.98	99.96	99.98	99.95	99.96

It is impossible in carefully examining this table, not to observe how very little difference really exists between the specimens of the same variety grown upon different soils; the numbers given for red clover on sand and clay, are, in most respects, singularly alike; and the same of the two columns for the white clover.

It would not be by any means safe to draw very decided conclusions from one or two analyses of this kind; but, so far as an opinion may be formed, the evidence would tend to prove that the *mineral* constitution of clover is but little affected by the character of the soil on which it grows; whilst, on the other hand, the different *varieties* of the plant are found to possess a mineral constitution in some respects essentially distinct.

Mineral Matters contained in a Ton of Red and White Clover Hay.
(In lbs. and tenths.)

	Red Clover.	White Clover.
	lbs.	lbs.
Silica	5.2	6.3
Phosphoric acid	10.0	19.9
Sulphuric acid	6.6	12.4
Lime	55.6	45.5
Magnesia	17.7	14.0
Peroxide of iron	1.5	3.4
Potash	23.2	24.7
Soda	2.2	6.4
Chloride of sodium	3.7	8.5
Chloride of potassium	4.7	......
	128.4	141.1

ANALYSIS OF THE ASH OF PEAS AND BEANS.

We give below a very important analysis of the ash of peas and beans, and of their straw, by Prof. Way, of the Royal Agr. College, Cirencester, England. This comprises the latest and most authentic researches by this distinguished chemist, and cannot but be interesting to farmers, as showing, in small space, the mineral elements which these crops draw from the soil.

	Peas.	Beans.	Pea straw.	Bean straw.
Silica	1.24	0.88	5.36	8.86
Phosphoric acid	34.81	31.87	4.50	7.35
Sulphuric acid	5.68	4.50	5.66	3.21
Carbonic acid	1.82	1.94	14.74	22.78
Lime	6.32	8.65	37.99	21.29
Magnesia	6.57	6.55	6.78	4.88
Peroxide of iron	0.59	0.36	1.76	0.90
Potash	40.19	42.13	17.17	21.26
Soda	0.65	0.90	2.48	4.56
Chloride of sodium	0.68	1.90	3.57	9.05
Chloride of potassium	1.42	0.84	......	0.90
Total	99.97	100.00	99.96	99.99

ASH OF FLAX SEED.

Professor Way, of the Royal Agricultural College, England, gives the following as the mean of several analyses of the ash of flax or lint seed, recently made by him, and published in the Journal of the Royal Agricultural Society:

Silica	1.45
Phosphoric acid	38.54
Sulphuric acid	1.56
Carbonic acid	0.22
Lime	8.40
Magnesia	13.11
Peroxide of iron	0.50
Potash	34.17
Soda	1.69
Chloride of sodium	0.36
Total	100.00

Seven samples of American Oil-Cake gave the following results:

Oil	11.41
Water	7.60
Nitrogen	4.74
Ash	6.35

From the above figures, the scientific farmer will see, that the manure formed by 100 lbs. of oil cake is more than that derived from 300 lbs. of Indian corn. 300 lbs. of corn contain about 1¼ lbs. phosphoric acid; 100 lbs. oil cake contain about 2½ lbs.

ANALYSIS OF PRAIRIE SOIL.

(We insert with pleasure the following analysis of a specimen of prairie soil, from the farm of Dr. J. A. Kennicott, of The Grove, Ill., made by Prof. James V. Z. Blaney, of Chicago.)

The soil analyzed was taken from a "roll" of the prairie, at or near the summit of the "roll" or elevation. A sod two inches thick was first removed, and the specimen then taken up with a spade—about 6 inches deep; the central portion of which was used for the analysis.

Description.—The soil was a loose, friable loam, of a very intense black color when moist, greyish-black when dry. It contained some small fibres of grass roots, and no gravel. *A mechanical analysis* was first made, as follows: A weighed portion of the soil was treated with distilled water, and agitated for some time; then allowed to settle for one minute; the water poured off into another vessel, and allowed to stand to deposit the pulverulent matter which it held in suspension. This process was continued until the washings ceased to hold any particles in suspension. The sandy matter left, and the pulverulent matter washed over were each collected on a weighed filter, washed, dried at 212° F., and weighed. The filtrates of both were mixed, evaporated to dryness at 212°, and weighed, giving matter soluble in cold water. A separate portion of the soil, which had been exposed for a long time to a moderately dry air, was dried at 212°, and the hygrometric moisture thus ascertained. These processes gave the following

Results of the Mechanical Analysis.

	Per cent.
Hygrometric moisture	3.50
Sandy particles	66.90
Finely divided do	29.20
Matter soluble in cold water	0.10
	99.70
Loss	0.30
	100.00

A separate analysis was made of the coarser and finer particles. Analysis of the coarser particles gave the following results:

	Per cent.
Organic matter and combined water, together	8.00
Matter insoluble in hydrochloric acid—say, silica	84.00
Combined silica (probably in combination with alkalies)	0.50
Alumina	2.50
Sesquioxide of iron	3.00
Carbonate of lime	1.00
Magnesia and alkalies together	2.00
	101.00

Analysis of the finely divided particles gave

	Per cent.
Organic matter and combined water	10.00
Matter insoluble in hydrochloric acid—say, silica	76.00
Combined silica, (a trace)	
Alumina	4.25
Sesquioxide of iron	4.25
Carbonate of lime	1.50
Magnesia and alkalies, together	2.50
	98.50

The error in the former analysis is, I think, in a measure, due to the fact, that the iron exists in the sandy matter as a protoxide, probably in combination with silica; hence, when calculated as a sesquioxide, it gives too much by about 0.40 per cent.

In the latter analysis, I presume that the iron exists in the form of a protocarbonate. If such be the case, nearly two per cent. should be added, to obtain a correct result.

The analysis of the soil as a whole, as calculated from the above, would give the following as a very close approximation to the truth:

Hygrometric water	3.500
Organic matter and combined water	8.166
Silicious matter insoluble in hydrochloric acid	77.286
Silica combined	0.828
Alumina	2.880
Sesquioxide of iron	3.458
Carbonate of lime	1.094
Matter soluble in cold water, (not examined)	1.000
Magnesia and alkalies, (not separated)	2.369
	100.081

Had a little more time been allowed to me, I would have ascertained with accuracy the amount of alkalies, and also in what state of combination they exist, as carbonates, sulphates, or silicates. I would also have critically examined the organic matter, and tested for the presence of phosphates. I have ascertained that nitrogen is present in the organic matter, as ammonia is evolved at a high temperature.

For the absorbent power of the soil, I find that a specimen, which had been exposed for some time to dry air, when exposed 48 hours over water at 60° F., gains 3 per cent. of water by capillary absorption. Another portion, of the same degree of dryness, exposed *in vacuo* over sulphuric acid at 60° F., lost, in 48 hours, 3.20 per cent. of water, by evaporation into a perfectly dry atmosphere.

The difference in the amount of water retained by capillary attraction, in an atmosphere saturated at 60° F., and that in perfectly dry air at the same temperature, may be stated at 6.20 per cent.

Respectfully yours,

JAMES V. Z. BLANEY.

Hon. Thos. Ewbank, *Washington*.

Chicago, *April 3d*, 1850.

VIII.

STATISTICAL TABLES.

TOBACCO TRADE.

Baltimore, *February* 26, 1850.

Sir:—In complying with your request to furnish a statement of the tobacco trade, we have been enabled to obtain some statistics that will no doubt be interesting.

It affords us pleasure to state that the markets no longer labor under the depression that has existed for four years past; the growth for the last two years has been much less than the consumption, and the surplus occasioned by the heretofore excessive production finds purchasers at increased prices, and at this time our markets are almost bare of stocks. The amount of tobacco consumed is so limited that the trade will not admit of an excessive growth. In the two most thickly-populated countries of Europe—France and England—not more than a certain quantity finds its way there; in France the trade is monopolized by government, which gives out contracts to deliver a stipulated quantity at certain prices; in England the duty imposed is so enormous that only a limited quantity of certain descriptions can be shipped, without the risk of loss. In Germany and Holland, where the trade is more extensively carried on than elsewhere, the duty imposed is almost nominal, and all classes of their citizens are enabled to use the weed, at prices very little higher than its first cost. The tobacco trade constitutes so large a staple of our country, that it is singular greater efforts are not made upon the part of our government to cause a reciprocal duty to be imposed, that more favor may be shown by European governments to this particular article. England, from the duty imposed upon it alone, derives a revenue of $18,000,000, being about $800 the hogshead, or from 10 to 16 times its original cost. France makes the trade a monopoly, from which she derives an income of about $15,000,000.

	Hogsheads.	
Stock of tobacco in Baltimore, 1st January, 1849	32,690	
Inspected during 1849	45,876	= 78,566
Exported and consumed during 1849		58,938
On hand 1st January, 1850		19,628
Stock of tobacco, "Western," in New Orleans, Feb. 13, '50		6,188

The aggregate stock in the two markets show 25,816 hhds., and yet the number of hhds. for sale in factors' hands will not reach 1000—the rest being held by shippers and speculators.

The prices of tobacco must rule high this year, which we fear will be an inducement to planters to make heavy crops, which would undoubtedly tend again to overstock the markets and depress prices. The estimated crops of 1849 are as follows: Maryland, 25,000 hhds.; Virginia, 45,000 hhds.; Ohio, 12,000 hhds.; Kentucky, 60,000 hhds.

Statement of the Tobacco Business in Holland, during 1849.

		MARYLAND.			VIRGINIA.				KENTUCKY.				STEMS.		
	Stock 1st Jan. 1849.	Imports.	Sales.	Stock last Dec. 1849.	Stock 1st Jan. 1849.	Imports.	Sales.	Stock last December.	Stock 1st January.	Imports.	Sales.	Stock last December.	Stock 1st Jan.	Imports.	Sales.	Stock last December.
Rotterdam	1966	10,881	9,814	2983	2029	1101	2980	150	781	41	762	10	.			
Amsterdam	5740	9,804	10,269	5275	1001	251	977	275	1073	none	467	606				

Statement of Imports, Sales, and Stocks of Tobacco and Stems, in Bremen, from 1840 to 1850.

In the Year.	MARYLAND. Stock 1st January.	MARYLAND. Imports.	MARYLAND. Sales.	MARYLAND. Stock last December.	VIRGINIA. Stock 1st January.	VIRGINIA. Imports.	VIRGINIA. Sales.	VIRGINIA. Stock last December.	KENTUCKY. Stock 1st January.	KENTUCKY. Imports.	KENTUCKY. Sales.	KENTUCKY. Stock last December.	STEMS. Stock 1st January.	STEMS. Imports.	STEMS. Sales.	STEMS. Stock last December.
1840	4,890	14,570	18,899	1,061	245	3492	8422	285	181	8,808	3,699	285	2863	8362	4564	1051
1841	1,061	19,629	18,821	2,369	285	3466	3025	726	285	5,206	4,941	550	1651	7085	7054	1682
1842	2,369	20,821	19,067	4,123	726	6729	5898	1557	550	9,407	8,939	1018	1682	4151	5886	447
1843	4,123	18,483	15,004	7,602	1557	5541	4242	2856	1018	7,485	6,441	2062	447	3968	3447	969
1844	7,602	16,978	18,338	6,242	2856	5092	4282	3666	2062	9,786	9,569	2229	969	4758	5513	209
1845	6,242	24,251	24,571	5,922	3666	1588	3099	2155	2269	11,489	10,628	3340	209	5278	4152	1330
1846	5,922	26,785	23,788	8,919	2155	2386	2456	2085	3340	5,028	6,099	2269	1330	6092	4716	2706
1847	8,919	21,743	20,681	9,981	2085	911	2079	917	2269	3,816	5,013	1072	2706	6788	8038	1456
1848	9,981	12,084	9,935	12,130	917	847	1054	710	1072	4,448	4,980	540	1456	4912	4473	1895
1849	12,130	19,285	22,112	9,303	710	1172	1734	149	540	4,620	4,746	414	1895	4168	5083	1000

RICHARD H. HALL & SON.

HOGS PACKED IN THE WEST—1849-50.

LAFAYETTE, INDIANA, *February* 29, 1850.

SIR:—Having been engaged in the packing and purchasing of pork in the Western States for the last nine years, and frequently seeing publications as to the number of hogs packed, which in many instances get embodied in your Reports, which I have known to be very erroneous, I have taken the liberty to send you statistics which I believe to be correct. I have been to some considerable pains to ascertain accurately, and in most cases by personal inquiry, (having visited recently the principal packing points in the States of Indiana, Illinois, and on the Mississippi river,) the number of hogs packed in the Western States for the season of 1849-50.

It will be remembered by many that a statement originating from me, was published in the N. Y. Tribune, March 7th, 1849, giving the number of hogs packed at some of the principal packing points, amounting to over 1,400,000, without including a large number of smaller places, which I soon after obtained, increasing the number to 1,977,500.

Subsequently, on receiving circulars from authentic sources, or which should have been deemed good authority, published at Cincinnati and Boston, showing only about two-thirds of that number, I was induced to think that the information was not obtained from reliable sources; as the receipts of barrel pork at New Orleans to the close of the last season was 550,600 bbls.; and my recent visit through the principal sections of the pork-packing country, has satisfied me that the number of hogs cut, west of the Alleghany mountains, for 1848-49, could not have been less than 2,050,000.

There has been this year the usual quantity packed for the European markets; and it should be recollected, from the many public improvements progressing in the Western States, and the consequent demand for that consumption, that a large proportion of the side pork and joints will not go into bbls., and will not reach an Eastern market.

I have no returns from the Missouri and Cumberland rivers, and shall have to estimate the quantity that has been packed there. Nearly all the pork cut on those rivers is made into bacon, and from the Missouri a large proportion will be required for the Californian emigrants.

There are a few other small points that I have no accounts from, but I believe the following will not vary much from the true number cut for 1849-50:—

OHIO.

Miami and Scioto valleys	122,000
Cincinnati	393,775
Ripley (estimated)	8,000
Total	523,775

KENTUCKY.

Maysville	14,000
Louisville (including Jeffersonville and New Albany)	184,000
Total	198,000

INDIANA.

Rising Sun and Aurora (estimated)	16,000
White Water Canal	62,000
Lawrenceburgh (estimated)	8,000
Madison	86,709
Indianapolis	14,000
Evansville	14,500
White River	16,000
Vincennes	14,500
Terre Haute	59,566
Durkey's Ferry	4,500
Clinton	13,000
Armiesburgh	8,500
Montezuma	3,000
Newport	3,700
Eugene	8,800
Perrysville	4,900
Covington	6,200
Williamsport	6,000
Attica	8,100
Independence	600
Lafayette	39,200
Jefferson	4,500
Frankfort	1,900
Americus	900
Delphi	9,600
Logansport	5,000
Peru	2,800
Wabash	4,500
Huntington	800
Lagro	2,200
Laporte	2,000
Michigan City and vicinity	2,100
Total	426,575

ILLINOIS.

On the Wabash and Illinois Rivers.

Darwin	3,500
York and vicinity	1,000
Hendersonville	3,600
Mt. Carmel and vicinity	5,500
Shawneetown	12,000
Ottawa	1,700
Peru	1,500
Princeton	3,700
Hennepin and Warren	3,500
Lacon	11,500
Chillicothe	3,800
Peoria	21,000
Galesburgh	1,200
Washington	1,000
Spring Bay	500
Pekin	26,000
Westley	300
Tremont	1,000
Canton	19,000
Liverpool	400
Lewiston	750
Springfield	19,500
Lindville	1,500
Winchester	2,500
Exeter	2,000
Beardstown	31,000
Naples	6,500
Meredocia	9,000
Lancaster and Farrington	6,800
Ellisville	1,200
Abbington	800
Florence and Pittsford	3,000
Perry	3,000
Greggsville	6,000
Havanah	350
Brushville, Macomb, and Frederick	9,000
Lagrange	2,000
Alton, on the Mississippi	30,000
Chicago, winter packing	11,500
Total	268,100

MISSISSIPPI RIVER.

Chester	1,000
Sparta (back)	1,500
St. Louis (10,000 steamed early in the fall)	124,000
Hannibal	24,500
Quincy	29,000
Warsaw	3,000
Keokuk	19,000
Burlington	29,000
Bloomington	3,500
Oquawka	1,200
Monmouth	1,200
Kuthsburgh	4,000
Rock Island	3,000
New Boston	1,000
Hampton	3,000
Wapolis	5,900
Total	252,900

RECAPITULATION.

Ohio	523,755
Kentucky	198,000
Indiana	428,575
Illinois	268,100
Mississippi River	252,900
Missouri River (estimated)	75,000
Cumberland River (estimated)	100,000
Other small points overlooked	25,000
Grand Total	1,871,330
City of Baltimore in 1848–49	150,000
" " " 1849–50	100,000

Yours respectfully,

L. CADWELL.

Hon. THOMAS EWBANK,

Commissioner of Patents.

IMPORTS OF BREADSTUFFS INTO GREAT BRITAIN.

An Account of the Total Quantity of Wheat and Wheat Flour imported into Great Britain from Ireland, from 1801 *to* 1825.

Year.	Qrs. (8 Bus.)	Year.	Qrs. (8 Bus.)	Year.	Qrs. (8 Bus.)
1801	150	1810	126,888	1818	106,179
1802	108,751	1811	147,245	1819	153,850
1803	61,267	1812	158,352	1820	403,407
1804	70,071	1813	217,154	1821	569,700
1805	84,087	1814	225,478	1822	463,004
1806	102,276	1815	189,544	1823	400,068
1807	44,900	1816	121,631	1824	356,884
1808	48,493	1817	55,481	1825	396,018
1809	66,944				

The Quantity of Corn, Meal, and Flour, imported into Great Britain from Ireland, in the Years 1826 *to* 1849.

Year.	Wheat.	Oats.	Barley.	Beans & Peas.	Malt.	Oatmeal.	Wheat Flour.
	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.	Cwt.	Cwt.
1826	241,925	1,179,896	64,885	8,642	1,203	194,602	255,240
1827	468,820	1,946,389	67,791	11,319	572	486,966	618,818
1828	474,994	1,805,866	84,204	11,894	858	424,749	621,569
1829	340,084	1,417,729	97,140	14,879	2,011	402,127	626,268
1830	337,641	1,226,486	189,745	21,578	2,820	....	672,265
1831	407,714	1,286,254	185,489	19,171	10,888	581,371	524,318
1832	552,740	1,062,786	128,689	16,445	8,220	611,412	881,434
1833	541,475	1,858,588	101,707	21,760	7,017	642,692	1,059,587
1834	462,229	1,277,598	217,855	20,947	8,865	772,994	1,110,463
1835	340,585	1,462,581	156,242	27,682	10,857	566,006	1,124,348
1836	249,360	1,627,824	184,156	20,524	22,214	675,470	1,169,200
1837	252,720	1,634,720	187,478	25,690	4,174	1,004,876	982,990
1838	209,600	1,946,050	156,467	26,816	5,001	1,252,741	1,168,195
1839	90,600	1,290,000	61,676	18,019	2,861	877,000	519,000
1840	92,990	1,397,500	95,954	15,976	8,456	989,500	280,700
1841	113,225	1,667,542	75,568	16,762	4,985	1,357,321	333,183
1842	112,400	1,275,200	50,200	21,450	3,050	1,549,500	318,500
1843	191,700	1,559,500	109,650	25,500	8,600	1,705,300	770,100
1844	200,200	1,509,000	90,700	19,600	8,000	1,150,000	839,000
1845	371,000	1,678,000	92,000	14,300	11,000	1,058,000	1,421,000
1846	187,300	956,000	93,000	17,000	11,000	554,000	725,000
1847	125,700	493,000	47,500	27,000	6,500	330,500	211,000
1848	146,000	1,081,000	79,700	14,700	6,300	936,600	561,000
1849	94,500	652,000	48,500	24,600	5,000	672,000	393,500

An Account of the Corn, Meal, and Flour, imported into Great Britain in each year, from 1st Jan. 1815 to 1849.

Year.	Imported from Ireland.	Imported from the British North American Colonies.	Imported from all other parts.	Total Imported.
	Qrs.	Qrs.	Qrs.	Qrs.
1815	821,192	25	333,041	1,154,258
1816	873,865	3	319,203	1,193,071
1817	695,651	25,877	1,715,353	2,436,881
1818	1,204,733	56,618	3,474,051	4,735,402
1819	967,680	14,257	1,693,255	2,675,192
1820	1,415,722	40,897	1,300,953	2,757,572
1821	1,822,816	40,916	216,738	2,080,470
1822	1,063,089	23,439	102,365	1,188,893
1823	1,528,153	209	53,432	1,581,794
1824	1,634,000	891	609,147	2,244,038
1825	2,203,962	95,059	962,118	3,261,789
1826	1,698,392	80,500	2,218,830	3,942,722
1827	2,828,460	61,085	2,550,310	5,439,805
1828	2,826,590	21,600	1,272,396	4,120,586
1829	2,307,244	7,335	2,680,414	4,994,993
1830	2,215,521	79,634	2,355,412	4,650,567
1831	2,429,182	225,240	3,316,760	5,971,182
1832	2,990,676	129,476	668,422	3,788,665
1833	2,737,441	117,745	336,624	3,191,710
1834	2,792,658	66,829	592,071	3,351,558
1835	2,679,438	25,016	296,189	3,000,643
1836	2,958,272	18,561	625,032	3,601,865
1837	3,030,293	19,060	1,306,870	4,356,223
1838	3,474,302	19,479	1,515,250	5,009,031
1839	2,248,151	17,438	4,578,660	6,834,249
1840	2,827,782	178,828	3,811,694	6,818,304
1841	2,355,525	308,382	3,878,599	6,542,506
1842	2,083,600	247,127	3,475,970	5,806,697
1843	2,721,400	146,647	1,299,776	4,167,823
1844	2,460,800	297,926	2,794,357	5,553,083
1845	2,292,800	312,438	2,118,707	5,423,945
1846	1,625,000	431,075	4,480,302	6,536,777
1847	879,900	546,431	11,769,728	13,196,059
1848	1,827,000	229,318	7,125,688	9,182,338
1849	1,175,000	210,510	10,616,338	12,001,848

COMMERCE OF THE UNITED STATES.

Commerce and Navigation.

We lay before our readers a condensed statement of the Commerce and Navigation of the United States with foreign countries, for the fiscal year of 1849, taken from the Official Report of the Register of the Treasury, laid before the Senate on the 26th December.

COMMERCE.

Statement of the Total Value of Goods, Wares, and Merchandise imported into the United States, in American and foreign vessels, during the year ending June 30th, 1849.

	In American Vessels.	In Foreign Vessels.	Total.
Paying duties	$103,293,220	22,186,554	125,479,774
Free of duty	17,088,932	5,288,733	22,377,665
Total	$120,382,152	27,475,287	147,857,439

Statement of the Total Commerce of the United States, from the 1st of July, 1848, to 30th June, 1849.

VALUE OF EXPORTS.

Domestic produce:	
In American vessels	$91,363,303
In foreign vessels	41,304,647
Total	$132,667,950
Foreign produce:	
In American vessels	$9,169,815
In foreign vessels	3,919,050
Total	$13,088,865
Total of American and foreign produce	$145,756,815

VALUE OF IMPORTS.

In American vessels	$120,382,152
In foreign vessels	27,475,287
Total	$147,857,439

Summary Statement of the Value of Domestic Exports during the year ending June 30, 1849.

THE SEA.

Dried fish, or cod fisheries	$419,092
Pickled fish, or river fisheries	93,085
Whale and other fish oil	965,597
Spermaceti oil	572,768
Whalebone	337,714
Sperm candles	159,403
Total	$2,547,654

THE FOREST.

Skins and furs	$656,228
Ginseng	182,966
Staves, shingles, boards, timber	1,776,749
Other lumber	60,344
Masts and spars	87,720
Oak bark and other dye	95,892
All manufactures of wood	1,697,828
Naval stores, tar, pitch, rosin, and turpentine	845,164
Ashes, pot and pearl	515,603
Total	$5,917,994

AGRICULTURE.

	$2,058,958
Beef, tallow, hides, horned cattle	1,654,157
Butter and cheese	9,245,885
Pork (pickled), bacon, lard, and live hogs	96,982
Horses and mules	16,305
Sheep	81,015
Wool	1,756,848
Wheat	11,280,582
Flour	7,966,369
Indian corn	1,169,625
Indian meal	218,248
Rye meal	
Rye, oats, and other small grain, and pulse	139,793
Biscuit, or ship-bread	364,318
Potatoes	83,313
Apples	93,904
Rice	2,569,362
Tobacco	5,804,207
Cotton	66,396,967
Hemp	8,458
Flax seed	4
Hops	29,123
Brown sugar	24,906
Indigo	49
Total	$111,059,378

Statement showing the Total Value of Exports during the Year ending June 30.

	In American Vessels.	In foreign Vessels.	Amount to each Country.
Russia	$864,621	$72,936	$937,557
Prussia	6,944	27,759	34,703
Sweden and Norway	117,132	608,149	725,281
Swedish West Indies	88,044	7,084	95,128
Denmark	175	54,963	55,138
Danish West Indies	678,578	48,619	727,197
Hanse Towns	738,125	1,992,123	2,710,248
Hanover	....	8,496	8,496
Holland	1,435,943	719,385	2,155,328
Dutch East Indies	257,188	23,635	280,823
Dutch West Indies	302,409	14,657	317,066
Dutch Guiana	100,966	3,017	104,013
Belgium	2,012,636	430,428	2,443,064
England	44,519,160	24,642,832	69,161,992
Scotland	1,880,969	1,668,991	3,549,960
Ireland	2,272,740	1,643,602	3,916,342
Gibraltar	678,335	45,484	723,819
Malta	28,119	23,114	51,233
British East Indies	332,962	....	332,962
Cape of Good Hope	94,422	....	94,422
Mauritius	7,884	13,847	21,731
Honduras	191,347	....	191,347
British Guiana	604,681	57,634	662,315
British West Indies	3,196,105	739,729	3,935,834
Canada	1,254,145	1,066,178	2,320,323
British American Colonies	916,851	2,694,932	3,611,783
France, on the Atlantic	10,069,418	1,577,194	11,646,592
France, on the Mediterranean	746,834	130,313	877,147
French West Indies	121,321	59,410	180,731
Miquelon and French Fisheries	20,370	....	20,370
French Guiana	44,504	1,657	46,161
Bourbon	9,473	....	9,473
Spain, on the Atlantic	157,812	12,259	169,071
Spain, on the Mediterranean	161,351	1,458,072	1,619,423
Teneriffe and other Canaries	17,840	....	17,840
Manilla and Phillipine Islands	137,868	....	137,868
Cuba	4,564,651	76,494	4,641,145
Other Spanish W. I.	512,693	10,599	523,292
Portugal	105,614	64,107	169,021
Madeira	80,588	37,290	117,878
Fayal, and other Azores	14,204	....	14,204
Cape de Verd Islands	62,647	....	62,647
Italy	640,007	171,443	811,450
Sicily	16,459	7,900	24,359
Sardinia	320,310	140,640	460,950
Tuscany	26,800	3,276	30,076
Trieste, and other Austrian ports	727,105	215,384	942,489
Turkey, Levant, &c.	182,410	11,466	193,876
Hayti	485,082	47,494	532,577
Mexico	955,112	92,877	1,047,999
Central Republic	53,739	58,741	112,480
New Grenada	214,258	30,202	244,460
Venezuela	415,792	15,629	431,421
Brazil	2,701,120	137,260	2,838,380
Cisplatine Republic	105,113	29,525	134,638
Argentine Republic	435,714	159,804	595,518
Chili	1,641,047	81,410	1,722,457
Peru	93,195	....	93,195
China	1,460,945	....	1,460,945
West Indies generally	101,219	5,110	106,329
South America do.	85,215	....	85,215
Europe do.	....	18,588	18,588
Asia do.	344,436	....	344,436
Africa do.	609,871	66,898	676,769
South Seas and Pacific	336,660	....	336,660
Total	$91,868,308	$41,303,647	$132,666,955

UNITED STATES EXPORTS TO FOREIGN PORTS.

Foreign Exports of Wheat and Rye Flour, Corn Meal, Wheat, Corn, Rye, &c., and Ship Bread, from the United States, during the Year commencing 1st July, 1848, and ending 30th June, 1849.

EXPORTED TO	WHEAT.		FLOUR.		INDIAN CORN.		Rye, Oats, &c.
	Bushels.	Dollars.	Barrels.	Dollars.	Bushels.	Dollars.	
Russia	193	288	2	15	....	....	10,787
Sweden & Norway	....	....	110	515	....	....	
Swedish W. Indies	....	....	7,573	30,759	1,280	995	1,058
Danish West Indies	....	....	49,568	246,487	2,850	1,778	2,960
Hanse Towns	....	....	1,829	7,614	69	56	
Hanover	....	....	....	....	250	160	
Holland	....	....	727	3,789	....	....	440
Dutch East Indies	....	....	4,625	27,488	....	....	
Dutch West Indies	....	....	17,221	94,188	3,222	2,819	3,897
Dutch Guiana	....	....	3,849	18,813	....	....	
Belgium	....	....	....	....	180	70	
England	901,940	1,090,184	836,680	4,446,978	7,859,642	4,645,450	12,009
Scotland	67,626	85,249	45,608	289,502	845,316	214,845	5,894
Ireland	103,114	125,836	71,527	370,740	4,191,284	2,686,881	180
Gibraltar	....	....	6,262	32,880	6,505	2,994	
Malta	....	....	210	1,210	....	....	
British East Indies	....	....	791	4,875	....	....	1,500
Cape of Good Hope	269	355	4,720	28,274	....	....	85
Mauritius	....	....	500	3,447	598	433	2,625
Honduras	....	....	4,125	23,580	552	374	16
British Guiana	....	....	38,502	194,207	15,412	10,161	12,723
British West Indies	7,798	10,265	265,049	1,846,231	197,044	117,705	58,845
Canada	140,696	112,066	19,127	78,129	49,621	20,265	1,487
British Am. Colonies	305,883	332,765	294,891	1,518,922	221,442	126,791	9,072
France, on the Atlantic	108	100	....	....	....	....	68
French West Indies	....	....	5,554	28,684	5,872	2,778	8,869
Miquelon, and other French Fisheries	....	....	1,701	9,711	....	....	20
French Guiana	....	....	1,890	8,930	40	28	400
Bourbon	407	216	....	....	....	....	220
Teneriffe and other Canaries	....	....	15	73	....	....	
Manilla and Phillipine Islands	....	....	60	388	....	....	
Cuba	....	....	7,154	39,247	12,631	7,117	8,392
Other Spanish West Indies	....	....	6,429	33,047	928	627	482
Madeira	....	....	4,358	23,171	93,828	59,072	
Cape de Verds	....	....	501	3,109	520	345	369
Italy	....	....	....	....	....	....	
Trieste, &c.	....	....	75	575			
Turkey, Levant, &c	....	....	50	300			
Hayti	....	....	10,903	59,183	270	186	74
Mexico	....	....	11,633	59,471	223,506	100,596	1,711
Central Republic	....	....	1,480	7,922	367	200	35
New Grenada	....	....	3,070	15,727	2,498	1,074	350
Venezuela	....	....	29,181	149,583	15,647	9,458	1,381
Brazil	....	....	314,808	1,885,203	506	366	750
Cisplatine Republic	....	....	13,821	70,352	2,085	1,402	87
Argentine Republic	....	....	6,592	35,936	....	....	6
Chili	....	....	5,129	33,004	....	....	697
Peru	....	....	1,050	4,716			
China	....	....	1,177	7,493	....	....	98
W. Indies generally	....	....	3,984	21,546	3,860	2,348	2,618
S. Amer. generally	....	....	....	....	....	....	
Asia generally	....	....	105	645			
Africa generally	....	....	4,617	27,670	....	....	173
S. Seas and Pacific	....	....	1,180	7,415	....	....	30
Total	1,527,534	1,756,848	2,108,013	11,280,582	13,257,309	7,966,369	189,793

Foreign Exports of Wheat and Rye Flour, Corn Meal, Wheat, Corn, Rye, &c., and Ship Bread, from the United States, during the Year commencing 1st July, 1848, and ending 30th June, 1849.

EXPORTED TO	INDIAN MEAL.		RYE MEAL.		SHIP BREAD.		
	Barrels.	Dollars.	Barrels.	Dollars.	Barrels.	Kegs.	Dollars.
Sweden & Norway	....	....	....	....	....	82	41
Swedish W. Indies	2,778	7,992	1,007	3,439	578	55	1,604
Danish West Indies	28,645	85,753	625	2,154	2,859	668	8,611
Holland	....	....	....	....	140	....	887
Dutch East Indies	....	....	....	....	825	495	1,719
Dutch West Indies	1,567	4,700	1,297	4,497	1,247	176	4,010
Dutch Guiana	219	631	....	....	201	....	770
Belgium	....	....	....	....	75	....	300
England	62,399	185,028	22	77	2,979	846	8,918
Scotland	1,778	5,321	....	....	[illegible]	....	150
Ireland	36,266	84,063	....	....	575	....	1,495
Gibraltar	....	....	....	....	180	20	549
Malta	....	....	....	....	200	....	523
British East Indies	....	....	....	....	190	....	750
Cape of Good Hope	....	....	....	....	247	....	485
Honduras	....	....	....	....	875	....	2,856
British Guiana	10,627	30,644	50	163	12,287	50	38,781
British West Indies	99,863	284,065	8,497	12,191	87,726	1,870	123,018
Canada	1,784	3,868	....	....	682	....	2,528
British Am. Colonies	153,979	484,109	57,166	191,582	25,467	1,646	78,882
France, on the Atlantic	1	4	....	....	50	....	71
French West Indies	524	1,644	....	....	188	1	454
Miquelon, and other French Fisheries	25	78	....	....	210	....	505
French Guiana	....	....	20	68	20	....	52
Teneriffe and other Canaries	....	....	....	....	8	109	100
Manilla and Philippine Islands	....	....	....	....	280	200	1,146
Cuba	431	1,152	....	....	1,727	1,904	7,256
Other Spanish West Indies	6,850	19,680	17	66	3,122	2,928	10,087
Madeira	300	804	582	1,985	10	125	106
Cape de Verds	....	....	....	....	1,431	....	5,614
Italy	....	....	....	....	12	....	80
Hayti	65	856	....	....	822	110	1,399
Mexico	....	....	....	....	4,230	858	11,372
Central Republic	1,280	2,700	....	....	183	....	401
New Grenada	208	560	....	....	801	451	2,740
Venezuela	4,841	14,175	146	546	633	195	2,587
Brazil	210	711	....	....	646	6,055	9,172
Cisplatine Republic	35	105	....	....	622	845	1,670
Argentine Republic	....	....	451	1,480	389	260	1,696
Chili	168	430	....	....	1,341	1,128	6,236
Peru	....	....	....	....	250	550	1,829
China	....	....	....	....	2,705	....	10,064
W. Indies generally	249	710	....	....	96	84	818
S. Amer. generally	....	....	....	....	50	....	176
Asia generally	....	....	....	....	65	....	256
Africa generally	68	206	....	....	2,430	765	9,695
S. Seas and Pacific	58	186	....	....	2,911	40	8,484
Total	405,169	1,169,625	64,880	218,248	11,187	21,378	364,318

TREASURY DEPARTMENT.—Total value of Exports $22,895,783.

Register's Office, Dec. 24th, 1849.

NAVIGATION.

Statement, showing the Number, and Class, of Vessels built, and the Tonnage thereof, in each State and Territory of the United States, for the Year ending June 30, 1849:

	Class.						Total tonnage.	
	Ships	Brigs	Schooners	Sloops and canal boats	Steamers	Total number of vessels built	Tons	95ths
Maine	119	107	105	6	7	344	82,255	56
New Hampshire	8	...	4	...	...	12	6,265	89
Vermont	...	...	...	...	...	...	...	
Massachusetts	88	7	65	9	1	113	28,888	48
Rhode Island	8	8	4	3	...	23	2,760	28
Connecticut	2	1	38	14	1	56	5,066	36
New York	17	8	64	155	21	265	44,104	26
New Jersey	...	1	57	27	2	87	8,025	65
Pennsylvania	8	2	27	102	68	197	24,207	78
Delaware	1	...	16	5	...	22	1,880	36
Maryland	9	9	129	...	5	152	17,462	98
District of Columbia	...	...	...	22	...	22	609	20
Virginia	1	2	32	1	2	38	3,094	65
North Carolina	1	1	24	3	...	29	3,032	27
South Carolina	...	...	6	...	2	8	655	57
Georgia	...	1	...	...	1	2	756	37
Florida	...	...	1	...	...	1	119	88
Alabama	...	...	2	1	...	3	106	54
Mississippi	...	...	...	...	...	...	...	
Louisiana	...	...	1	4	4	9	1,755	48
Tennessee	...	...	...	...	2	2	242	79
Kentucky	...	...	...	...	34	34	8,423	83
Missouri	...	...	...	8	11	19	2,886	51
Illinois	1	3	9	...	...	13	2,210	84
Ohio	...	2	9	8	44	63	12,816	92
Michigan	...	...	15	2	8	25	5,148	66
Texas	...	...	...	...	...	...	...	
Oregon	...	...	...	...	...	...	...	
Total	198	148	623	370	208	1547	256,577	47

It is seen that, in point of amount of tonnage, Maine is highest; New York, second; Pennsylvania, third; Massachusetts, fourth; Maryland, fifth; Ohio, sixth; Kentucky, seventh; New Jersey, eighth.

Of the inland States, Ohio has built the largest amount.

The amount built in the several inland States was as follows:

	Tons.
Ohio	12,816
Kentucky	8,423
Michigan	5,148
Missouri	2,886
Illinois	2,210
Tennessee	242
	31,725

In addition, there were built, at Pittsburgh, in Pennsylvania, about 60 steamers. We have no means at hand of ascertaining the proportion of the New York tonnage built on the lakes.

The tonnage of the principal ports of the United States was as follows:

Ports.	Tons.	95ths.
New York	796,491	79
Boston	296,890	04
New Bedford	123,911	57
Bath	88,820	84
Portland	84,568	80
Philadelphia	188,057	21
Baltimore	134,025	66
New Orleans	240,206	24
Charleston, S. C.	29,285	48
Wilmington, N. C.	16,641	87
Norfolk, Va.	23,016	26
Mobile	25,067	79
Buffalo	40,667	34
Pittsburgh	35,770	63
Detroit	33,466	94
St. Louis	32,255	08
Cuyahoga	30,047	11
Oswego	22,151	68
Chicago	17,822	43
Cincinnati	16,897	74

From this it is seen that the registered tonnage of 12 sea-port cities, including New Orleans, is 2,047,477 tons, against 228,585 tons, at eight inland cities. Of the latter, 84,922 tons belong to Cincinnati, Pittsburgh, and St. Louis.

The value of some of the principal articles of agriculture and manufactures exported, we compare with the exports of 1848:

Articles.	Values. 1848.	1849.
Beef, tallow, hides, and horned cattle	2,474,208	2,058,358
Butter and cheese	1,063,087	1,654,157
Pork, (pickled,) bacon, lard, and live hogs	3,883,884	9,245,885
Wheat	1,681,975	1,756,848
Flour	11,668,669	11,280,582
Indian corn	1,186,663	7,966,369
Indian meal	945,081	1,169,625
Tobacco	8,478,270	5,804,207
Hemp	....	8,458
Soap, and tallow candles	630,041	627,280
Snuff and tobacco	695,914	613,034
Iron, (pig,) bar, and nails	122,225	149,358
Cotton, printed and colored	380,549	466,574
Cotton, white	1,978,831	3,955,117
Cotton, nankeen	848,189	3,203
Cotton, twist, yarn, and thread	81,313	92,555
All manufactures of cotton	255,799	415,680

The greatest increase, in any article of agriculture, was in the product of the hog. In the exports of cotton goods, the figures show a most satisfactory increase.

In order to show the comparative extent of our commerce with the several nations, we give the total value of the exports to some of the principal countries:

Russia	$937,557
Prussia	84,703
Sweden and Norway	725,281
Danish West Indies	727,197
Hanse Towns	2,710,248
Holland	2,155,828
Belgium	2,443,064
England	69,161,992
Scotland	3,549,960
Ireland	3,916,842
British West Indies	3,935,834
Canada	2,320,823
France—on the Atlantic	11,646,612
France—on the Mediterranean	877,147
Spain	1,619,423
Cuba	4,641,145
Mexico	1,047,999
Brazil	2,838,880
Chili	1,722,457
China	1,460,945

The value of the exports to England, Ireland, and Scotland, exceeds, by $20,391,529, the exports to all other countries.

TERRITORIES.

Table showing the estimated surface of the Territories of the United States, north and west of the regularly organized States of the Union, and the portions of territory thereof, situated north and south of the parallel of 36 deg. 30 min. north latitude.

TERRITORIES.	Square Miles north of the parallel of 36° 30′.	Square Miles south of the parallel of 36° 30′.	Total Square Miles.
Oregon Territory, bounded on the north by the parallel of 49° north latitude, south by the parallel of 42° north latitude, east by the Rocky Mountains, and west by the Pacific Ocean	341,463	...	341,463
Territory north and west of the Mississippi river, bounded on the north by the parallel of 49° north latitude, east by the Mississippi river, south by the State of Iowa and the Platte river, and west by the Rocky Mountains	728,248	...	728,248
Wisconsin Territory, bounded east by the Mississippi river and north by the State of Wisconsin, being the balance remaining of the old Northwest Territory	22,886	...	22,886
Indian Territory, situated west of the States of Missouri and Arkansas, and south of the Platte or Nebraska river, held and apportioned in part for Indian purposes	190,505	58,346	248,851
*Territory in Upper California and New Mexico,** situated west of the Rio Grande to its source, and of a meridian line thence to the parallel of 42° north latitude, ceded to the United States by the treaty with Mexico of 1848	321,695	204,383	526,078
Total	1,599,247	262,729	1,861,976
That part of Texas which lies east of the Rio Grande and west of the Nueces river, from the mouth of the former river up to a line drawn from a point a short distance north of Paso to the source of the Ensenada river, is estimated at	...	52,018	52,018
And the part which lies north of Paso and the Ensenada river, up to latitude of 42° north	43,537	81,396	124,933
Making, together†	43,537	133,414	176,951

* This estimate excludes all that part of Texas which lies outside of its limits, as designated by the yellow shaded lines on Disturnell's Map of Mexico.

† This estimate, as will be seen, limits our acquisitions of territory from Mexico by the late treaty, exclusively to those portions of country lying west of the Rio Grande.

Texas in three Divisions.

	Square Miles.
1st. Between the Sabine and Nueces rivers, south of Ensenada river, (Texas proper)	148,569
2d. Between the Nueces and Rio Grande, south of Ensenada river	52,018
3d. North of Paso and the Ensenada river, (Santa Fe country)	124,933
Total	325,520

1st. Number of miles of coast acquired by the annexation of Texas, from the mouth of the Sabine to the Rio Grande... 400
2d. Number of miles of coast on the Pacific, including Oregon and California. In California, 970; Oregon, 500; Straits of Juan de Fuca, 150 ... 1,620
Total, including Texas... 2,020

Table exhibiting the Areas of the several States and Territories of the United States, in Square Miles and Acres.

FREE STATES.	Square Miles.	Acres.	SLAVE STATES.	Square Miles.	Acres.
Maine	35,000	22,400,000	Delaware	2,120	1,356,800
Vermont	8,000	5,120,000	Maryland	11,000	7,040,000
New Hampshire	8,030	5,139,200	Virginia	61,352	39,265,280
Massachusetts	7,250	4,640,000	North Carolina	45,500	29,120,000
Rhode Island	1,200	768,000	South Carolina	28,000	17,920,000
Connecticut	4,750	3,040,000	Georgia	58,000	37,120,000
New York	46,000	29,440,000	Kentucky	37,680	24,115,200
New Jersey	6,851	4,384,640	Tennessee	44,000	28,160,000
Pennsylvania	47,000	30,080,000	Louisiana	46,431	29,715,840
Ohio	39,964	25,576,960	Mississippi	47,147	30,174,080
Indiana	33,809	21,637,760	Alabama	50,722	32,462,080
Illinois	55,405	35,459,200	Missouri	67,380	43,123,200
Michigan	56,243	35,995,520	Arkansas	52,198	33,406,720
Iowa	50,914	32,584,960	Florida	59,268	37,931,520
Wisconsin	53,924	34,511,360			
Total	454,340	290,777,600	Total	610,798	390,910,720
			Texas	325,520	208,332,800
			District of Columbia	50	32,000

Territory north and west of the Mississippi River and east of the Rocky Mountains.

	Square Miles.	Acres.
Bounded north by 49° north latitude, east by the Mississippi river, south by the State of Iowa and Platte river, and west by the Rocky Mountains	723,248	462,878,720
Indian Territory, situated west of the States of Arkansas and Missouri, and south of the Platte river	248,851	159,264,640
Old Northwest Territory, balance remaining east of the Mississippi river and north of Wisconsin	22,336	14,295,040
Total of old territory not organized into States	994,435	636,438,400

	Square Miles.	Acres.
Area of Free States	454,340	290,777,600
" Slave States	610,798	390,910,720
" District of Columbia	50	32,000
" Territories east of the Rocky Mountains	994,435	636,438,400
Total	2,059,623	1,318,158,720

Territory exclusive of old Territory east of the Rocky Mountains.

	Square Miles.	Acres.
Oregon	341,463	218,536,320
California	448,691	287,162,240
New Mexico*	77,387	49,527,680
Texas*	325,520	208,332,800
Total	1,193,061	763,559,040

* Taking the Rio Grande as the boundary.

	Miles.
Length of the Atlantic coast to the mouth of St. Mary's river	1,450
Length of the Atlantic coast from St. Mary's river to Cape of Florida	450
Length of Gulf coast to the mouth of Sabine	1,200
Total	3,100

The new States are larger than some of the old ones.

The area of the State of California, according to an estimate made on Preuss's map of 1848, is 158,500 square miles.

Estimated surfaces of other States.		Square Miles.
California is about 3½ times larger than	Louisiana	46,431
" 2¼ "	Missouri	67,380
" 4¼ "	Kentucky	37,680
" 2½ "	Virginia	61,352
" 3½ "	New York	46,000
" 3½ "	Pennsylvania	47,000

	Miles.
The average distance of the sea coast from the eastern boundary of the new State of California, is	212
Total length from north to south	764
Length of sea coast	970

The surface of Deseret, estimated on Preuss's map, as follows:

	Square Miles.
Part situated in Oregon	20,000
Part situated in California Territory	340,000
	360,000
Part within proposed limits of State of California	70,270
Total	430,270

THE COTTON TRADE.

Comparative Statement of Receipts, Exports, and Stocks of Cotton, at the following places, at the dates annexed:

Ports.	Received since 1st Sept. 1849.	Received since 1st Sept. 1848.	Exported to Great Britain since 1st Sept. 1849.	Exported to Great Britain since 1st Sept. 1848.	Exported to France since 1st Sept. 1849.	Exported to France since 1st Sept. 1848.	Exported to North of Europe since 1st Sept. 1849.	Exported to North of Europe since 1st Sept. 1848.
New Orleans ....Feb. 16.	552,617	654,931	143,833	276,546	52,725	55,151	6,130	19,620
Mobile ....Feb. 16.	252,745	372,844	46,605	101,720	19,831	28,743	......	5,760
Florida ....Feb. 14.	116,667	102,620	8,649	11,912	......	993	5,654	1,481
Texas ....Feb. 13.	10,268	14,853	513	......	......	......	......	499
Georgia ....Feb. 20.	237,755	227,697	56,209	85,218	8,402	11,106	1,648	1,305
South Carolina ....Feb. 22.	259,501	288,497	86,643	102,104	21,384	19,252	5,876	11,880
North Carolina ....Feb. 23.	......	2,364	......	......	......	......	......	......
Virginia ....Feb. 1.	......	5,780	......	350	......	......	......	......
New York ....Feb. 26.	......	......	63,868	65,578	43,817	34,647	11,460	25,859
Other Ports ....Feb. 23.	......	......	723	2,629	......	173	401	169
Total ....Bales,	1,441,172	1,669,586	412,043	636,057	146,159	150,265	31,169	66,582
Increase	......	......	......	......	......	......	......	......
Decrease	228,414	......	224,014	......	4,106	......	35,413	......

Ports.	Exported to other Foreign Ports since 1st Sept. 1849.	Exported to other Foreign Ports since 1st Sept. 1848.	Total Exports to Foreign Ports since 1st Sept. 1849.	Total Exports to Foreign Ports since 1st Sept. 1848.	Shipments to Northern Ports since 1st Sept. 1849.	Shipments to Northern Ports since 1st Sept. 1848.	Stock on Hand and on Shipboard. 1850.	Stock on Hand and on Shipboard. 1849.	Stock on Hand 1st Sept. 1849.	Stock on Hand 1st Sept. 1848.
New Orleans ....Feb. 16.	34,037	43,849	236,725	395,166	129,212	92,741	215,440	227,011	15,486	27,401
Mobile ....Feb. 16.	5,932	13,000	72,368	149,232	45,125	58,790	133,889	171,295	3,046	23,584
Florida ....Feb. 14.	......	1,310	14,303	15,806	53,864	40,026	40,272	46,250	615	507
Texas ....Feb. 13.	......	......	513	499	12,202	8,649	1,824	4,143	452	747
Georgia ....Feb. 20.	200	......	66,459	97,829	105,367	86,680	69,745	50,812	11,800	16,050
South Carolina ....Feb. 22.	4,855	7,448	118,758	140,684	102,824	106,516	63,299	58,978	28,808	14,085
North Carolina ....Feb. 23.	......	......	......	......	6,314	2,364				
Virginia ....Feb. 1.	......	......	......	350	......	......	750	650	1,750	444
New York ....Feb. 26.	577	3,024	124,722	119,308	......	......	90,867	61,879	67,025	41,967
Other Ports ....Feb. 23.	1	265	1,125	3,236	......	......	......	......	16,250	16,030
Total ....Bales,	47,602	68,896	636,973	921,800	464,908	397,668	616,186	620,498	140,984	144,815
Increase	......	......	......	......	67,240	......				
Decrease	21,294	......	284,827	......	......	......	4,312	......	3,831	

Stock of Cotton in Interior Towns, not included in the Receipts:

	1850.	1849.
Augusta and Hamburg ....Feb. 1.	64,948	63,610
Macon, Georgia ....Feb. 1.	18,751	23,045
Griffin, Georgia		
Columbus, Georgia ....Feb. 9.	16,286	33,982
Montgomery, Alabama ....Feb. 11.	10,788	8,676
Columbus, South Carolina ....Feb. 1.	7,000	
Memphis ....Feb. 1.	7,088	

THE IRON TRADE.

The Supplies of Iron sent forward from the interior of Pennsylvania in 1848 and 1849, have been as follows:

1849—Route.	Bar and Sheet.	Pig and Scrap.	Castings & Blooms	Nails & Spikes.
	Lbs.	Lbs.	Lbs.	Lbs.
Chesapeake and Delaware Canal	4,568,391	41,091,879	3,691,825	925,986
Delaware Canal, Bristol	61,696	58,552,582	466,884	742,041
Schuylkill Navigation	7,968,200	77,490,560	6,854,860	2,582,720
Columbia and Reading Railroads	10,209,500	2,068,300	1,578,900	2,794,400
Norristown Railroad	4,448,060	5,985,600	2,020,416	
Totals	27,250,847	185,188,871	14,112,405	7,045,147

1848—Route.	Bar and Sheet.	Pig and Scrap.	Castings & Blooms	Nails & Spikes.
	Lbs.	Lbs.	Lbs.	Lbs.
Chesapeake and Delaware Canal..	14,988,260	88,718,098	5,536,410	1,870,298
Delaware Canal, Bristol	1,117,515	50,788,874	109,227	*1,838,415
Schuylkill Navigation	10,223,860	29,205,120	3,071,040	1,485,120
Columbia and Reading Railroads	18,730,700	7,347,400	4,229,705	7,119,600
Norristown Railroad	5,866,288	2,564,108	1,672,780	1,672,785
Totals	50,926,123	178,563,600	14,619,162	12,986,218

* Including 1,887,225 pounds of wire.

OREGON LUMBER TRADE.

We have been favored with the following, as a correct list of the vessels and cargoes now loaded, or in progress of loading, at the Williamette and Columbia rivers, most of which are ready to sail for California as soon as the weather (which has been so smoky as to detain them for some time) will permit:

Madonna	130,000	feet, sold for $100 per M...	$13,000
Ocean Bird	135,000	" ....worth	13,500
Sacramento	115,000	" .... "	11,500
Huntress	340,000	" .... "	34,000
Henry	90,000	" .... "	9,000
Aurora	200,000	" .... "	20,000
Diamond	115,000	" .... "	11,500
J. W. Cater	90,000	" .... "	9,000
Anita	90,000	" .... "	9,000
H. M. Feidler	180,000	" .... "	18,000
	1,485,000		$148,500

The discovery of the gold mines affects the United States beneficially, in creating powerful communities on the Pacific. The East is brought into proximity with the North American continent. So far as the gold is concerned, we can only hold that which is due to our superior activity and industry. Oregon will furnish the miners with bread and shelter, and thus receive a large amount of the gold. A strong, healthy man can make more money, and enjoy more health and life, in Oregon, than in California.

THE COTTON TRADE.

Comparative Statement of Receipts, Exports, and Stocks of Cotton, at the following places, at the dates annexed:

Ports.		Received since 1st Sept.		Exported to Great Britain since 1st Sept.		Exported to France since 1st Sept.		Exported to North of Europe since 1st Sept.		Exported to other Foreign Ports since 1st Sept.		Total Exports to Foreign Ports since 1st Sept.		Shipments to Northern Ports since 1st Sept.		Stock on Hand and on Shipboard.		Stock on Hand 1st Sept.	
		1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1850.	1849.	1849.	1848.
New Orleans	Feb. 16.	552,617	654,931	143,833	276,546	52,725	55,151	6,130	19,630	34,087	43,849	236,725	395,166	139,212	92,741	215,440	227,011	15,480	57,401
Mobile	Feb. 16.	252,745	372,844	46,605	101,720	19,831	23,743	......	6,769	5,932	13,000	72,368	149,232	45,125	58,790	133,889	171,295	5,046	23,584
Florida	Feb. 14.	116,607	102,620	5,649	11,912	......	993	5,654	1,481	......	1,310	14,303	15,896	58,864	40,028	40,272	44,280	615	507
Texas	Feb. 13.	10,268	14,853	613	......	......	[illegible]	......	499	......	......	613	499	12,202	8,640	1,924	4,143	452	747
Georgia	Feb. 20.	237,755	227,607	56,209	85,218	8,402	11,106	1,648	1,305	200	......	66,459	97,629	105,367	85,680	60,745	50,312	11,500	10,050
South Carolina	Feb. 22.	269,501	288,497	86,643	102,104	21,384	19,252	5,876	11,880	4,855	7,448	118,758	140,684	102,824	108,516	63,299	58,978	28,808	14,065
North Carolina	Feb. 23.	......	2,364	......	......	......	......	......	......	......	......	......	......	6,314	2,364				
Virginia	Feb. 1.	......	5,780	......	350	......	......	......	......	......	......	......	350	......	......	750	650	1,750	444
New York	Feb. 26.	......	......	68,868	65,578	43,817	34,847	11,460	25,859	577	3,024	124,722	119,308	......	......	90,867	61,879	67,025	41,967
Other Ports	Feb. 23.	......	......	723	2,629	......	173	401	169	1	265	1,125	3,236	......	......	......	......	15,250	16,030
Total	Bales,	1,441,172	1,669,586	412,043	636,057	146,159	150,265	31,169	66,582	47,602	68,896	636,973	921,800	464,908	397,668	616,186	620,498	140,904	144,515
Increase		......	......	......	......	......	......	......	......	......	......	......	......	27,240					
Decrease		228,414	......	224,014	......	4,106	......	35,418	......	21,294	......	284,827	......	......	......	4,312	......	3,611	

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Columbus, South Carolina	Feb. 1.	7,000	
Memphis	Feb. 1.	7,083	

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Delaware Canal, Bristol	61,696	58,552,532	466,884	742,041
Schuylkill Navigation	7,963,200	77,490,560	6,354,880	2,582,720
Columbia and Reading Railroads	10,209,500	2,068,800	1,578,900	2,794,400
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Totals	27,250,847	185,188,371	14,112,405	7,045,147

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Schuylkill Navigation	10,223,860	29,205,120	3,071,040	1,485,120
Columbia and Reading Railroads	18,730,700	7,347,400	4,229,705	7,119,600
Norristown Railroad	5,866,288	2,564,108	1,672,780	1,672,785
Totals	50,926,128	178,563,600	14,619,162	12,086,218

* Including 1,887,225 pounds of wire.

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Henry	90,000	" .... "	9,000
Aurora	200,000	" .... "	20,000
Diamond	115,000	" .... "	11,500
J. W. Cater	90,000	" .... "	9,000
Anita	90,000	" .... "	9,000
H. M. Feidler	180,000	" .... "	18,000
	1,485,000		$148,500

The discovery of the gold mines affects the United States beneficially, in creating powerful communities on the Pacific. The East is brought into proximity with the North American continent. So far as the gold is concerned, we can only hold that which is due to our superior activity and industry. Oregon will furnish the miners with bread and shelter, and thus receive a large amount of the gold. A strong, healthy man can make more money, and enjoy more health and life, in Oregon, than in California.

Mechanics in Oregon earn $10 per day. Miners do not, on an average, earn more than that, and work only six months. The result is the same in money; but the man who works at his trade retains his health, and enjoys life. As to farmers, we quote the Spectator again:

"We hold this truth to be self-evident, that Oregon, so far as soil, climate, and health are concerned, stands unrivaled as an agricultural country. The whole question is, will it pay? We make the following estimate of what one may do, supposing he has a small farm improved and stocked: 25 acres wheat, 20 bushels per acre, at $2 per bushel, $1,000; 20 head of cattle, 500 pounds each, at 10 cents per pound, $1,000; increased value of farm by culture and improvement, $1,000; making an annual advance of $3,000."

THE PROVISION TRADE.

The following is a comparative statement of the import of Provisions at Liverpool from the United States from 1st September to 9th January, 1848–49 and 1849–50:

	1848–49.	1849–50.
Pork, bbls	2,161	2,765
Beef, tcs	6	333
Beef, bbls	3,979	3,479
Bacon, casks	203	92
Bacon, boxes	3,459	4,281
Lard, tcs	2,572	1,479
Lard, casks	795	60
Lard, bbls	16,896	11,823
Lard, kegs	27,458	52,760
Cheese, casks	3,300	2,087
Cheese, boxes	51,906	74,904
Tallow, hhds	105	1,999
Flour, bbls	170,819	545,513
Wheat, bushels	333,973	650,569
Corn, bushels	758,227	2,450,285

THE WOOL TRADE.

Receipts of Wool from the Interior, on the New York and Pennsylvania Canals, and at Boston per Western Railroad, for three years:

	1847.	1848.	1849.
N. Y. Canals, lbs	17,044,000	8,729,407	12,731,402
Pennsylvania Canals, lbs	4,251,987	2,930,186	5,113,075
Western Railroad	8,823,600	3,598,596	4,701,600
Total	20,149,587	15,264,186	22,606,078
Total imports	8,450,006	11,881,429	17,869,022
Total	28,609,592	26,645,566	40,475,100
Dom. expenditures	878,440	781,102	159,925

This very considerable increase in supply has been attended by a constant increase in price, and the year closes, as compared with its commencement, as follows:

January, 1849	34@36	41@34	28@30	25@27
do, 1850	42@48	38@70	36@38	34@35
Increase	8@12	7 @ 7	8 @ 8	8 @ 8

An increase of 50 per cent. in the quantities delivered at tide-water, has been attended with a rising of 25@30 per cent. in prices; the market closing with great activity, and advancing rates with very light stocks.

THE TEA TRADE.

Statement of Imports and Exports of Teas into the United States for the Years ending December 31.

Imports.	1849.	1848.
Hyson, lbs	651,610	767,419
Young Hyson	9,225,754	7,906,695
Hyson Skin	2,167,432	2,320,906
Twankay	662,402	970,698
Gunpowder	839,680	907,107
Imperial	690,722	813,511
Total Green	14,237,700	13,686,336
Total Black	5,999,315	3,815,652
Total Green and Black	20,236,916	17,508,988

Exports.	1849. From U. S.	1848. From N. Y. only.
Hyson, lbs	145,950	165,689
Young Hyson	42,780	48,952
Gunpowder	20,890	24,724
Imperial	20,850	23,436
Total Green	280,470	262,708
Total Black	136,650	194,212
Total Green and Black	417,120	456,920

THE WHALE FISHERY IN 1849.

Importations of Sperm and Whale Oil and Whalebone into the United States in 1849.

Ports.	Barrels of Sperm Oil.	Barrels of Whale Oil.	Pounds of Whalebone.
New Bedford	[illegible]	72,961	797,300
Fairhaven	10,806	18,998	150,100
Mattapoisett	780	12	
Westport	2,018	100	800
Dartmouth		28	
District of New Bedford	60,450	92,106	947,900
Falmouth	2,060	115	
Edgartown	118	2,742	18,800
Nantucket	17,887	6,461	68,290
Provincetown	924	17	
Boston	1,360	3,445	202,800
Lynn	388	1,580	
Somerset	140		
Fall River	866	6,049	140,600
Providence	2,317	4,542	80,200
Warren	2,384	10,626	61,500
Newport	1,055		
Stonington	1,628	18,354	97,500
Mystic	1,509	6,747	51,100
New London	949	38,050	301,100
Bridgeport	354	2,702	27,300
Sagharbor	1,797	37,579	186,400
Greenport	587	[illegible]	78,400
Cold Spring	299	8,697	68,000
New Suffolk	242	814	1,200
New York	195	1,635	
Quincy			
Total, 1849	100,944	248,492	2,281,100

Imports for	Barrels of Sperm Oil.	Barrels of Whale Oil.	Pounds of Whalebone.
1848	107,976	280,656	2,003,000
1847	120,753	313,150	3,341,680
1846	95,217	207,493	2,276,939
1845	157,917	272,730	3,167,142
1844	139,594	262,047	2,532,445
1843	166,985	206,727	2,000,000
1842	165,637	161,041	1,600,000
1841	159,304	207,348	2,000,000
1840	157,791	207,908	2,000,000
Average for 10 years	137,212	236,759	2,320,281

Exports of Whale Oil from the Port of New Bedford in the Year 1849.

	Gallons.
To Rotterdam, 3 vessels	143,900
To Cowes, &c., 2 vessels	89,875
Total	233,775

From Boston.

	Gals. Sp.	Gals. Wh.	Lbs. W. Bone.
To England	85,465	34,145	4,500
To West Indies, &c.	7,477	50,372	
To Holland		7,259	
To Gottenburg	753		
To Gibraltar		2,000	
Total	93,875	93,776	4,500

Statement of the Average Price of Sperm and Whale Oil and Whalebone, for Nine Years.

	Sperm Oil.	Whale Oil.	Whale Bone.
Average for 1849	108	39	31
1848	100	36	30
1847	87	33	34
1846	88	32	33
1845	90	36	40
1844	63	34	35
1843	73	33	23
1842	94	31	19
1841	100	30	19

NORTH-WEST COAST FISHERY.

1839	2 ships averaged	1,400 bbls.	=	2,800 bbls.
1840	3 do.	587 bbls.	=	1,760 bbls.
1841	20 do.	1,412 bbls.	=	28,200 bbls.
1842	29 do.	1,627 bbls.	=	47,200 bbls.
1843	108 do.	1,349 bbls.	=	146,800 bbls.
1844	170 do.	1,528 bbls.	=	259,570 bbls.
1845	263 do.	953 bbls.	=	250,600 bbls.
1846	292 do.	869 bbls.	=	253,800 bbls.
1847	177 do.	1,059 bbls.	=	187,443 bbls.
1848	159 do.	1,164 bbls.	=	185,256 bbls.

In 1849, 150 ships are estimated to have cruised upon the North-west Coast, 50 of which only have yet been heard from, with an average catch of 1529 bbls.

Statement of Sperm and Whale Oil and Whalebone on hand in the United States, on the first day of January, for Six Years past.

	Barrels Sperm.	Barrels Whale.	Pounds Bone.
Jan. 1, 1850	8,760	16,000	440,000
1849	10,147	20,986	994,600
1848	5,696	29,126	921,500
1847	14,614	7,775	112,800
1846	40,701	5,221	211,000
1845	32,992	12,950	

Recapitulative Table of Vessels in the Whale Fishery, January 1, 1850.

	Tonnage.
New Bedford	77,188
Fairhaven	14,789
Westport	2,817
Dartmouth	111
Mattapoisett	1,760
Sippican	256
Wareham	374
District of New Bedford	97,191
Falmouth	1,106
Holmes's Hole	949
Edgartown	1,860
Nantucket	20,831
Provincetown	1,260
Lynn	720
Yarmouth	90
Quincy	100
Beverly	162
Somerset	137
Fall River	646
Warren	4,939
Providence	842
Newport	1,382
Stonington	5,877
Mystic	3,384
New London	15,909
Sag Harbor	7,935
Greenport	3,059
New Suffolk	227
Cold Spring	2,878
Total	171,484
January 1, 1849	196,110
January 1, 1850	171,484
	24,626

Showing a diminution in the whaling fleet, during 1849, of 71 ships and 1 brig; and the addition of 1 schooner and the diminution of 24,626 tons. —(*New Bedford Shipping List.*)

TOBACCO INSPECTIONS, &c., AT NEW YORK.

BELOW is a correct statement of the Inspections of Leaf Tobacco at this port, from 1834, the time of the establishment of the Inspection Warehouse in this city, to the close of 1849, inclusive, and the Stocks at the Warehouse at the beginning of each month for 12 years.

INSPECTIONS.

	Kentucky. Hogsheads.	Va. and N. C. Hogsheads.	Ohio. Hogsheads.	Maryland. Hogsheads.	Total Hogsheads.
1834	3,657	1,754	413	85	5,909
1835	11,278	2,130	1,131	190	14,729
1836	10,495	87	2,509	16	13,107
1837	6,047	683	409	10	7,149
1838	7,599	360	71		8,030
1839	6,630	972	24	121	7,747
1840	10,263	3,502	63		13,830
1841	9,955	2,056	57		10,068
1842	8,236	1,128	61		9,420
1843	11,729	254	68		12,051
1844	6,052	544	2	36	6,634
1845	7,387	180	48	45	7,660
1846	5,701	1,735	102	161	[illegible]
1847	[illegible]	1,993	90	4	12,204
1848	9,983	975	55	9	11,022
1849	10,753	2,254	29	100	13,136

STOCKS.

	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850
January	1767	1090	3744	2497	2419	6219	4121	3355	2901	5200	5581	6064
February	1286	1210	3433	2417	2400	6288	3990	3625	2612	5260	5295	
March	1204	1128	2700	2724	2055	5970	3800	3109	2456	5278	4903	
April	2070	1381	3035	2396	2209	5895	3568	2850	2348	5244	4414	
May	2391	1034	3376	2188	2622	5809	3463	2536	2506	5787	4347	
June	2704	1983	2772	1787	3517	5631	3765	2586	2425	5504	4153	
July	3101	2544	4565	2814	4164	6210	3427	2488	2881	6238	5570	
August	2639	3176	4174	2948	4222	5818	3486	2901	2934	7523	7042	
September	3391	4521	3575	3548	5580	5746	3747	3826	3854	8252	7986	
October	3086	4465	3430	2934	6784	5336	4396	3996	5187	8580	8197	
November	2234	4281	3072	2817	6441	4624	3594	3974	6186	7763	7146	
December	1455	3552	2826	2348	6826	6875	3072	2914	5098	6266	6307	

MAINE.

TRADE OF CALAIS, (WASHINGTON COUNTY.)

The following statistics give the trade of Calais, as exhibited by records for the year 1849. This town is one of the largest in the county, and had, in 1840, a population of three thousand.

Arrivals at the Port of Calais for the Year ending Dec. 31st, 1849, 612 Vessels.

IMPORTS.

Corn, bushels	88,118
Flour, bbls	22,413
Pork, bbls	2,883

Clearances during same Period, 608 Vessels.

EXPORTS.

Pine Boards, feet	10,542,000
Spruce Lumber, feet	27,342,000
Hemlock Lumber, feet	2,198,000
Laths	57,306,000
Pickets	2,654,000
Shingles	14,244,500
Hackmetack knees	18,902
Hemlock Bark, cords	707
Sugar box shooks	5,676
Potatoes, bbls	1,246

The season of 1849 was very unfavorable to the manufacturing of lumber, in consequence of the great drought, and it is very certain that the exports of lumber in good sawing seasons will much exceed that of 1849.

ESTIMATE OF LUMBER TRADE ON MACHIAS RIVER, 1849.

Surveyed and Sold at East Machias.

Boards and Scantling, feet	8,300,000
Laths	10,500,000

Surveyed and Sold at Machias.

Boards and Scantling, feet	7,800,000
Laths	10,000,000
Shingles	125,000

Surveyed and Sold at Whitneyville.

Boards and Scantling, feet	7,300,000
Laths	9,150,000
Shingles	100,000

The lumber manufactured at Whitneyville is transported by steam, over railroad, a distance of seven miles, to Machias Port, taken thence by vessels at any season of the year.

COMMERCE OF PORTLAND.

Arrivals.

The number of Arrivals from foreign ports in 1848 and 1849 was:

	1848.	1849, to Sept. 30.
American vessels	120	91
Foreign vessels	195	242
Total	315	333
Tonnage	41,185 15	46,500 27

Clearances.

The whole number of Clearances for foreign ports, for 1848 and 1849, was

	1848.	1849, to Sept. 30.
American vessels	187	126
Foreign vessels	190	244
Total	377	370
Tonnage	53,959 60	52,177 58

Imports.

The Imports from Foreign ports, in 1848 and 1849, were:

	1848.	1849, to Sept. 30.
In American vessels	$538,576	$338,903
In Foreign vessels	77,469	90,399
Total	$616,045	$429,302

Exports.

The Exports in 1848 and 1849 were:

	1848.	1849, to Sept. 30.
Foreign merchandise in American vessels	$292	$13,560
Do. do. Foreign vessels	1,297	959
Domestic produce in American vessels	608,671	387,183
Do. do. Foreign vessels	12,979	21,557
Total	$623,239	$423,259

Imports into Portland Coastwise, of Flour and Corn.

	Flour, bbls.	Corn, bush.
In 1844	60,806	103,134
1845	74,447	153,764
1846	80,000	130,000
1847	82,700	125,000
1848	112,400	232,123
1849	158,814	194,267

By comparing the Flour receipts for the several years as set down above, it will be seen that there has been a large increase in this department of business in our city, and that the amount received last year is nearly double that of 1847.

The average receipts of Corn for the same period have been about the same for each year.

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IMPORTS.

Corn, bushels	83,118
Flour, bbls	22,413
Pork, bbls	2,888

Clearances during same Period, 608 Vessels.

EXPORTS.

Pine Boards, feet	10,542,000
Spruce Lumber, feet	27,[illegible],000
Hemlock Lumber, feet	2,198,000
Laths	57,506,000
Pickets	2,654,000
Shingles	19,244,500
Hockmetor knees	18,902
Hemlock Bark, cords	707
Sugar box shooks	5,676
Potatoes, bbls	1,246

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Laths	9,150,000
Shingles	100,000

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	1848.	1849, to Sept. 30.
American vessels	120	91
Foreign vessels	195	242
Total	315	333
Tonnage	41,185.15	46,500.27

Clearances.

The whole number of Clearances for foreign ports, for 1848 and 1849, was

	1848.	1849, to Sept. 30.
American vessels	187	126
Foreign vessels	190	244
Total	377	370
Tonnage	53,959.60	52,177.58

Imports.

The Imports from Foreign ports, in 1848 and 1849, were:

	1848.	1849, to Sept. 30.
In American vessels	$538,576	$338,903
In Foreign vessels	77,469	90,399
Total	$616,045	$429,302

Exports.

The Exports in 1848 and 1849 were:

	1848.	1849, to Sept. 30.
Foreign merchandise in American vessels	$292	$13,560
Do. do. Foreign vessels	1,297	959
Domestic produce in American vessels	608,671	387,183
Do. do. Foreign vessels	12,979	21,557
Total	$623,239	$423,259

Imports into Portland Coastwise, of Flour and Corn.

	Flour, bbls.	Corn, bush.
In 1844	60,806	103,134
1845	74,447	153,764
1846	80,000	130,000
1847	82,700	125,000
1848	119,400	232,123
1849	168,814	194,267

By comparing the Flour receipts for the several years as set down above, it will be seen that there has been a large increase in this department of business in our city, and that the amount received last year is nearly double that of 1847.

The average receipts of Corn for the same period have been about the same for each year.

Vessels Built in the District of Portland and Falmouth in 1849.

Ships	11
Barques	8
Brigs	6
Schooners	6
Tonnage	10,179

There are several new vessels in dock finishing, the aggregate tonnage of which will not fall much, if any, short of 2500 tons, so that the whole amount of tonnage built in the District the past year, may be put down at twelve thousand five hundred tons.—(*Portland Advertiser.*)

Vessels Built in the District of Waldoboro' in 1849.

	Vessels.	Tons.
Waldoboro	18	4,066 87
Warren	10	8,718 03
Thomaston	4	2,418 41
East Thomaston	8	2,866 81
South Thomaston	5	1,810 91
Damariscotta	5	3,488 06
Newcastle	7	4,452 83
Bristol	7	1,048 45
St. George	4	656 68
		23,965 55

This statement exhibits an increase over any former year.

Vessels Built in the District of Bath in 1849.

	No. of Vessels.	Tons.	Average Tonnage.
Ships	27	18,316 21	678 38
Barques	7	2,513 05	359 01
Brigs	5	844 98	169 06
Schooners	4	544 80	136 20
Steamer	1	44 11	

BANGOR LUMBER TRADE.

The amount of lumber surveyed at Bangor in the season of 1849, was 160,418,808 feet. Of this, the green lumber consisted of Pine, 74,176,561 feet; Spruce, 23,619,349 feet; Hemlock, &c. 2,562,587 feet—making 100,358,697 feet in all. A correspondent of the Bangor Whig says of the remainder, 60,060,111 feet, that it included lumber piled last season, likewise that piled out during the present season, together with lumber hauled from the interior. The amount piled out this season, including that from the adjacent towns, hauled to market on teams, will not probably exceed 8,000,000, leaving a balance of 52,000,000 piled out last season (1848).

MASSACHUSETTS.

COMMERCE OF BOSTON.

The Boston Shipping List, of the 2d inst., contains its usual annual statement of the business of that port for the year 1849, from which we gather such facts as will most interest the general reader.

The arrivals of vessels from foreign countries, for a number of years, show a steady increase. They were as follows:

1845	2,330	1847	2,755
1846	2,052	1848	3,101
1849	3,183		

The coastwise arrivals and the clearances, as far as known, were as follows:

Year.	Arrivals.	Clearances.
1849	6,199	3,174
1848	6,118	3,187
1847	7,125	3,198
1846	6,775	2,672
1845	5,631	3,054

IMPORTS IN 1849.

Cotton.

The imports in 1849 were as follows:

From New Orleans	bales, 122,778
Mobile	48,291
Charleston	27,463
Savannah	34,935
Apalachicola	32,578
Galveston	2,707
Other places	1,245
Total—1849	270,693
1848	239,958
1847	198,932

Leather.

The imports of Sole have been as follows:

	Sides.	Bundles.
From New York and Albany	190,585	1,124
Baltimore	23,099	13,736
Philadelphia	3,011	5,781
Maine	18,184	937
Alexandria	58	503
Georgetown		163
New Orleans		3,293
Apalachicola		40
Newbern, N. C.	334	
By Western Railroad	103,871	15,858
Total—1849	339,142	41,425
1848	582,053	25,791
1847	658,004	26,686

Boots and Shoes.

In connexion with the above, the following statement shows the quantity of Boots and Shoes cleared at the Custom-house, mostly for Southern Ports:

1849	cases, 101,871
1848	79,118
1847	72,424

Flour and Meal.

The receipts of Flour have been as follows:

From New York	bbls. 107,016
Albany	57,916
Western Railroad	343,507
Fitchburg Railroad	200
New Orleans	265,420
Fredericksburg	82,452
Georgetown	23,212
Alexandria	19,337
Richmond	72,539
Other places in Virginia	8,930
Philadelphia	35,120
Baltimore	55,898
Other places	10,267
Total—1849	bbls. 1,026,309
1848	985,578
1847	1,037,719

The receipts of Corn Meal for three years have been as follows:

1849	bbls. 28,185
1848	41,144
1847	25,080

Grain.

The receipts of Corn in 1849 were:

From New Orleans	bush. 208,859
Ports in Virginia	968,173
Maryland	685,215
Pennsylvania	280,500
Delaware	85,486
New York	544,119
Other places	22,466
Total, 1849	2,789,318

The receipts of Corn and Oats have been as follows:

	Corn.	Oats.
1849	bush. 2,789,318	449,824
1848	3,338,293	384,368
1847	2,584,528	521,728

The receipts of Wheat, Rye, and Shorts, have been as follows:

	Wheat.	Rye.	Shorts.
1849	bush. 510,671	40,478	66,258
1848	336,247	65,189	48,988
1847	171,127	50,256	83,620

Gunny Bags.

The imports have been as follows:

	Bales.	Bundles.	No.
1849	14,071	6,048	156,150
1848	16,580	7,875	579,372
1847	8,880	3,664	198,064

Hides.

The imports have been as follows:

Buenos Ayres, Rio Grande, and Montevideo		No. 339,291
Rio Janeiro		30,673
Valparaiso		34,055
Bahia		21,344
Other Foreign Ports		60,827
Coastwise Ports		85,886
Calcutta	bales, 2,477	
Total—1849	2,477	572,076
1848	4,788	459,507
1847	1,902	472,962

Goat Skins.

The imports have been as follows:

	Bales.	No.
1849	5,750	33,255
1848	7,356	41,905
1847	4,788	38,455

Hemp.

The imports have been as follows:

	Tons.	Bales.
From Russia	1,248	
Manilla		28,005
New Orleans		6,191
Other Places	171	3,462
Total—1849	1,419	37,658
1848	1,322	51,285
1847	928	45,834

Lead.

The imports have been as follows:

1849	pigs, 180,365
1848	164,394
1847	157,767

Molasses.

The imports have been:

	Hhds.	Tcs.	Bbls.
Foreign	59,383	3,477	1,218
Coastwise	13,162	185	2,124
Total—1849	72,545	3,662	3,342
1848			83,434
1847			81,232

Naval Stores.

The receipts of Naval Stores have been:

		1849.	1848.	1847.
Rosin	bbls.	28,596	9,825	10,141
Turpentine		87,906	23,006	56,729
Spirits Turpentine		10,965	5,514	7,895
Pitch		2,844	405	2,774
Tar		24,858	19,959	16,228

Saltpetre.

The receipts have been:

1849	bags,	30,050
1848		24,524
1847		19,070

Sugars.

The imports have been:

		1849.	1848.
From Foreign Ports	bxs.	41,502	64,894
Domestic Ports		6,231	7,767
Foreign Ports	hhds.	8,396	8,348
Domestic Ports		2,686	8,448
Foreign Ports	bags,	68,852	71,298
Domestic Ports		1,447	1,974
Foreign Ports	bbls.	1,140	721
Domestic Ports		16,862	6,248
Foreign Ports	bskts.	742	851

Tobacco.

The imports have been:

	Hhds.	Bales.	Bxs. & Kegs.
1849	2,091	8,850	27,080
1848	2,112	4,544	32,018
1847	2,004	4,780	38,750

Wine.

The imports have been:

	Packages.	Gallons.
1849	10,765	232,168
1848	12,293	349,837
1849	12,342	273,468

Wool.

The receipts of Domestic, by Western Railroad and water, have been:

	Bales.
1849	23,808
1848	17,698
1847	10,618

The receipts of Foreign have been:

	Bales.	Quintals.
1849	14,815	6,000
1848	17,707	11,425
1847	4,759	26,630

Provisions.

The receipts have been:

		1849.	1848.
Beef	bbls.	38,667	23,053
Pork		117,704	97,890
Hams	casks,	12,942	8,728
Hams	bbls.	5,803	8,594
Lard		58,906	52,619
Lard	kegs,	66,924	44,726
Cheese	casks,	6,623	17,239
Cheese	bxs.	94,536	49,680
Cheese	tons,	620	535
Hogs	No.	34,175	28,924

Rice.

The receipts have been:

1849	casks,	15,458
1848		11,447
1847		9,727

Salt.

The receipts have been:

From Great Britain	bush.	534,808
Other ports in Europe		409,648
West Indies		405,098
British American Colonies		27,170
Total—1849		1,376,224
1848		1,366,584
1847		1,370,976

EXPORTS IN 1849.

Cotton.

The exports to Foreign Ports, for three years past, have been as follows:

1849	bales,	4,308
1848		7,766
1847		6,477

Domestic Goods.

The exports to Foreign Ports have been as follows:

	Bales & Cases.	Value.
1849	33,309	$1,600,457 65
1848	50,952	2,206,802 64

Flour.

The exports have been as follows:

To Foreign Ports	bbls.	133,687
Coastwise Ports		20,246
Total—1849		153,933
1848		129,678
1847		186,728

Corn Meal.

The exports have been:

1849	bbls.	32,788
1848		42,842
1847		44,903

Grain.

The exports of Corn and Wheat have been as follows:

		Corn.	Wheat.
1849	bush.	325,768	524
1848		518,866	21,249
1847		568,025	14,863

Hops.

The exports to Foreign Ports have been as follows:

1849	bales,	391
1848		605
1847		455

Ice.

Exports to Foreign and Coastwise Ports:

1849	tons,	66,008
1848		57,507
1847		54,625

Lead.

The exports have been:

To Foreign Ports	pigs,	667
Coastwise Ports		1,107
Total—1849		1,774
1848		13,677
1487		8,978

Lumber.

The exports have been:

		Lumber.	Shingles.
1849	M.	23,011	10,851
1848		9,619	1,620
1847		8,873	2,557

Molasses.

Exported during past year:

	Hhds.	Tcs.	Bbls.
To Foreign Ports	3,750	289	164
Coastwise Ports	12,031	535	572
Total—1849	15,781	824	736
1848	13,967	859	505
1847	29,586	2,700	1,258

Nails.

The exports have been as follows:

1849	casks,	72,077
1848		39,423
1847		46,821

Naval Stores.

The exports of Naval Stores from this Port for three years past have been as follows:

		1849.	1848.	1847.
Rosin	bbls.	16,568	15,077	25,130
Spirits Turpentine		1,892	2,828	4,123
Tar		10,285	6,192	5,857
Pitch		6,020	5,440	5,168
Turpentine		4,006	2,509	5,587

Provisions.

The exports to Foreign and Coastwise Ports have been:

			1849.	1848.
Pork,	Foreign	bbls.	27,455	18,460
	Coastwise		16,161	7,652
Lard,	Foreign		10,166	13,607
	Coastwise		1,746	2,197
	Foreign	kegs	28,430	31,771
	Coastwise		2,343	4,658
Beef,	Foreign	bbls.	6,589	3,644
	Coastwise		8,401	634
Cheese,	Foreign	boxes	10,107	6,283
	Coastwise		2,073	503
	Foreign	casks	201	200
	Coastwise		59	24

Rice.

The exports have been:

1849	casks,	4,787
1848		4,581
1847		4,227

Spirits.

The exports have been:

		Foreign.	Domestic.
1849	galls.	50,840	641,176
1848		67,281	479,802
1847		18,371	400,706

Sugars.

The exports to Foreign Ports have been:

	Bxs.	Hhds.	Bbls.	Bags.
1849	9,717	521	1,554	1,249
1848	5,887	941	2,185	2,500
1847	5,450	272	3,292	300

Tallow.

Export for three years:

1849	2,178
1848	3,244
1847	4,899

Tobacco.

The exports have been:

	Hhds.	Bales.	Bxs. & kegs.
1849	1,540	3,714	9,828
1848	1,619	2,584	9,100
1847	1,827	4,248	10,778

(*Boston Shipping List.*)

STATEMENT OF BRIGHTON MARKET FOR 1849.

46,465	Beef Cattle, sales estimated	$1,765,670
20,085	Stores	482,040
148,965	Sheep	297,910
80,120	Swine	430,645
		$2,976,265

1848.

40,784	Beef Cattle	Sales estimated at $2,830,302
20,553	Stores	
146,755	Sheep	
87,690	Swine	

1847.

43,425	Beef Cattle	Sales estimated at $2,719,462
20,738	Stores	
133,550	Sheep	
62,015	Swine	

1846.

38,670	Beef Cattle	Sales estimated at $1,871,113
15,164	Stores	
105,850	Sheep	
44,940	Swine	

NEW YORK.

ARRIVALS AT NEW YORK, 1849.

From Foreign Ports.

We are indebted for the following Statement of Foreign Arrivals at this Port, to the politeness of Mr. Jas. Thorne, Boarding Officer United States Revenue Department, Whitehall:

Steamers	76
Ships	787
Barques	725
Brigs	1,156
Galliots	9
Schooners	484
Total	3,237

Coastwise.

	Steamships	Ships.	Barques.	Brigs.	Schooners.	Total.
January	7	25	35	65	310	442
February	5	25	30	39	257	356
March	5	41	43	80	503	672
April	11	33	33	69	512	658
May	10	14	21	43	368	456
June	10	20	18	66	482	596
July	11	19	10	37	317	394
August	9	10	8	42	344	413
September	8	8	18	48	436	518
October	10	14	10	48	363	445
November	6	24	17	57	329	433
December	......	25	22	53	283	390

Whole number as above	5,773
Which added to the Foreign	3,237
Makes a total for the year of	9,010
Whole number last year	9,481
Decrease	471

Note.—In the above there are no Sloops included, which, if added to the many Schooners from Virginia and Philadelphia, with wood and coal, which, though consigned here, discharge their cargoes at Brooklyn, Williamsburg, Jersey City, and the adjacent towns on the Hudson, and are not boarded, owing to the remoteness of those points for general business, would make the number much greater. We estimate the *Schooners* that arrive at the above places, and are not reported, at six per day, which we think a small estimate; this would give for the year, 2190 additional Schooners to be added to the Coasting trade, making the whole number of Coastwise arrivals for 1849, 7963.

SUGAR AND MOLASSES.

Comparative Tables of the Imports of Sugar and Molasses at the Port of New York:

Imported from	Sugar. 1849. Boxes.	Sugar. 1848. Boxes.	Sugar. 1849. Hogsheads.	Sugar. 1848. Hogsheads.
Havana	26,055	66,024	8,090	2,618
Matanzas	15,006	36,425	5,513	5,103
Cardenas	708	956	8,453	6,197
Sagua-la-Grande	2,299	2,068	9,206	9,545
San Juan	107	78	1,409	1,509
Cienfuegos	2,184	2,256	6,896	4,046
Trinidad	10,008	5,575	3,375	3,157
St. Jago	1,521	2,272	4,421	3,614
Neuvitas	1,364	3,324	2,210	1,905
Mansanilla and Santa Cruz	....	21	265	128
Total from Cuba	59,247	118,999	44,838	37,812
Porto Rico	....	....	25,599	29,292
St. Croix	....	....	1,420	1,462
Louisiana	....	....	44,172	34,818
Texas	....	....	2,465	722
Coastwise	2,440	4,018	8,914	5,879
Total	61,687	123,017	127,408	109,485
Decrease	61,330			
Increase	....	....	17,923	

Sugar.

Imported from		1849.	1848.
Manilla	bags,	55,616	69,719
Brazil		17,705	8,901
Coastwise		20,488	10,872
Total		93,809	89,492
Increase		4,317	

Molasses.

Imported from		1849.	1848.
Havana	hhds.	2,016	2,884
Matanzas		5,898	7,037
Cardenas		15,383	18,720
Mariel		1,091	1,258
Sagua-la-Grande		4,115	4,428
San Juan		591	380
Cienfuegos		2,442	1,967
Trinidad		6,446	6,569
St. Jago		197	301
Neuvitas		4,021	2,933
Mansanilla and Santa Cruz		959	865
Total from Cuba		43,159	46,887
Porto Rico		9,254	13,081
St. Croix		1,783	1,870
Louisiana		12,718	15,107
Texas		1,258	516
Coastwise		13,873	11,971
Total		82,045	89,882
Decrease		7,837	

Stock of Sugar, January 1st.

		1850.	1849.
Havana, &c.	bxs.	1,699	14,127
San Juan	hhds.	859	1,821
Porto Rico	hhds.	568	508
Manilla	bags,	23,866	7,074
Brasil	bags,	764	
Louisiana	hhds.	1,945	2,720
Texas	hhds.	41	

IMPORTS OF NAVAL STORES.

Receipts of Naval Stores at New York, from Jan. 1, 1849, to Dec. 31, 1849.

Date.	Turpentine.	Tar.	Rosin.	S. Turp'ne.
January	7,182	3,784	23,751	5,095
February	5,401	3,428	6,658	2,691
March	20,602	4,920	12,411	5,090
April	16,492	12,918	35,128	7,724
May	7,261	9,012	24,079	4,956
June	12,028	5,878	30,241	5,886
July	11,368	1,775	23,040	5,608
August	17,859	2,681	22,333	6,580
September	21,709	2,812	15,232	7,899
October	19,261	4,671	27,810	5,977
November	6,329	3,506	17,933	3,797
December	10,678	3,914	28,131	4,886
	156,115	58,794	262,742	66,189
1848	204,015	41,140	171,884	57,295

Sundries.

		1849.	1848.
Turpentine	hhds.	....	109
Spirits Turpentine		33	162
Do. do.	pipe,	....	1
Do. do.	tcs.	....	55
Do. do.	hlf. bbls.	....	21
Do. do.	keg,	1	
Tar	hlf. bbls.	311	31
Tar	hhds.	2	
Rosin	tons,	....	175
Pitch	bbls.	1,177	3,160
Rosin Oil		....	75

Exports of Naval Stores from the Port of New York, for the year 1849.

	Turpentine. Bbls.	Tar. Bbls.	Rosin. Bbls.	S. Turpentine. Galls.
To Great Britain and Ireland	151,606	29,841	82,622	119,625
N. of Europe	2,706	583	34,583	161,463
Other places	606	5,510	26,549	86,998

EXPORTS OF BREADSTUFFS.

The annexed Official Statement exhibits the quantity of Flour and Grain exported from the Port of New York for the month of January, distinguishing the destination:

	Flour, U. States.	Flour, Canada.	Corn, U. States.	Wheat, Canada.	Meal, Puns.	U. States, Bbls.
London	491	1,590				
Liverpool	18,500	25,745	109,600	28,599		
Glasgow	2,878	1,932				
Ireland	......	......	6,068			
British N. Am. Colonies	1,558	600	400	5,700	......	1,118
British W. Indies	1,214	......	669	......	......	628
St. Domingo	1,944					
Spanish W. Indies	960	......	......	......	85	275
Danish W. Indies	390	......	......	......	375	125
Brazils	6,789					
Venezuela	525					
Dutch W. Indies	745					
Swedish W. Indies	320					
Total	31,814	29,867	116,732	34,299	460	2,181

It will be perceived that the shipments of Canada Flour were nearly equal to those of United States manufacture, and that the shipments of wheat were entirely Canadian.

COMMERCE OF PHILADELPHIA.

EXPORTS IN 1849.

The following is an Official Statement of the amount and value of the Exports from Philadelphia during the year ending 30th of September last:

	Amount.	Value.
Flour	bbls. 233,397	$1,187,584
Wheat	bush. 242,554	284,650
Corn	1,205,223	749,021
Corn Meal	bbls. 118,291	336,523
Rye Meal	26,351	82,060
Ship Bread	22,514	79,866
Ship Bread	kegs. 7,320	
Potatoes	bush. 4,508	3,371
Apples	bbls. 670	1,012
Rice	tcs. 2,301	48,174
Cotton	lb. 1,359,109	104,808
Tobacco	hhds. 1,196	67,818
Candles	lb. 7,358,471	148,870
Soap	1,153,968	
Snuff	190,074	49,639
Tobacco, Mfd	10,653	
Dried Fish	qtls. 2,660	6,887
Pickled Fish	bbls. 671	2,766

	Amount.	Value.
Beef	4,077	$87,573
Tallow	lb. 274,816	
Pork	bbls. 11,288	693,273
Hams	lb. 5,591,428	
Lard	2,340,584	
Butter	546,292	80,852
Cheese	210,372	
Tar and Pitch	bbls. 616	10,391
Rosin	6,423	
Sperm Oil	galls. 2,909	3,180
Whale Oil	54,166	26,820
Sperm Candles	lb. 90,731	28,991
Coal	tons, 1,709	6,938
Bark	hhds. 1,620	53,168
Pulse or Small Grain		11,011
Furniture		9,740
Manufactured Iron		104,947
Drugs		15,579
Domestic Cottons		166,071

Value of Exports from the Port of Philadelphia to Foreign Ports, for the year ending 30th September, 1849:

Fourth Quarter, 1848.		
In American vessels	$1,217,342	$1,516,448
In Foreign vessels	199,106	
First Quarter, 1849.		
In American vessels	$1,122,963	$1,239,722
In Foreign vessels	116,759	
Second Quarter, 1849.		
In American vessels	$1,188,672	$1,482,649
In Foreign vessels	293,977	
Third Quarter, 1849.		
In American vessels	$682,749	$915,238
In Foreign vessels	232,489	
Total for the year		$5,154,059

EXPORTS FOR EIGHT YEARS.

The following table shows the Exports of Wheat and Rye Flour, Corn Meal, Wheat and Corn, from this port annually, for the last eight years:

Year.	Wheat Flour. Bbls.	Rye Flour. Bbls.	Corn Meal. Bbls.	Wheat. Bush.	Corn. Bush.
1842	161,866	22,530	97,884	87,953	83,772
1843	28,517	22,303	106,484	32,235	74,613
1844	196,433	21,904	101,356	23,375	110,068
1845	201,956	17,098	115,101	86,089	129,256
1846	366,610	19,730	144,857	245,136	279,820
1847	420,684	20,407	300,531	523,538	1,102,210
1848	179,507	15,537	140,014	207,092	817,150
1849	220,786	26,536	91,349	177,812	906,823

COAL.

Sent to Philadelphia.

The comparative supplies of Coal sent from the mines in 1848 and 1849, have been as follows:

	1848.	1849.
Schuylkill mines, by Canal	436,602	486,075
do do by Railroad	1,216,232	1,112,488
Lehigh	680,193	800,987
Lackawanna	434,267	454,240
Wyoming	231,271	258,080
Shamokin	19,357	19,658
Pine Grove	56,938	78,299
Lyken's Valley	2,000	25,000
Total, tons	3,082,860	3,235,777
Increase of 1849 over 1848		152,917

Imports of Foreign Coal into the United States.

Official Statement of the amount and value of Coal imported into the United States during the year ending on the 30th of June, 1849:

Where from.	*Tons.*	*Value.*
England	68,079	$156,154
Scotland	1,469	2,721
Ireland	600	1,487
British Am. Colonies	131,565	245,693
Other places	1,500	3,277
Total	198,213	$409,282

The following table shows the imports of Foreign Coal into the United States, annually, from 1821 to the 1st of July, 1849. The duty on Foreign Coal under the present Tariff is 30 to 45 cents ℔ ton on board:

	Tons.		*Tons.*
1821	22,122	1836	108,430
1822	34,523	1837	153,450
1823	30,433	1838	129,083
1824	7,228	1839	181,551
1825	25,645	1840	162,867
1826	35,665	1841	155,394
1827	40,257	1842	141,526
1828	32,302	1843	41,163
1829	45,393	1844	87,073
1830	58,136	1845	85,771
1831	36,508	1846*	156,855
1832	72,978	1847†	148,021
1833	92,432	1848	196,251
1834	71,626	1849	198,213
1835	49,969		

(*Philadelphia Commercial List.*)

* From 1st December, 1846, to 30th June, 1847.
† For the year ending 30th June, 1848.

COMMERCE OF BALTIMORE.

The following is a statement of the foreign commerce of the port of Baltimore for the year 1849. It exceeds that of 1848 upwards of two millions of dollars:

Foreign merchandise imported in American vessels	$5,255,218
Do. do. do. Foreign vessels	505,941
Total value of imports, year 1849	$5,761,159
Exports of Domestic produce in American vessels	$7,049,725
Do. do. do. Foreign vessels	1,374,401
Do. of Foreign mdse. in American vessels	121,470
Do. do. do. Foreign vessels	144,084
Total value of exports, year 1849	$8,689,680

	No. Vessels.	Tons.	Men.
Entries of American vessels from foreign ports	359	84,260	3,372
Entries of Foreign vessels from foreign ports	137	27,882	1,246
Total entries, year 1849	496	112,142	4,618
Clearances of American vessels to foreign ports	461	111,026	4,620
Clearances of Foreign vessels to foreign ports	163	34,523	1,636
Total clearances, 1849	624	145,549	6,256

The inspections of Flour in the city of Baltimore for the years 1848 and 1849 were as follow:

	1849.		1848.	
	Barrels.	Halves.	Barrels.	Halves.
Howard Street	472,565	4,109		
City Mills	284,227	23,053		
Susquehanna	16,272			
Family	27,622	505		
Total	750,686	27,667	627,078	25,953

Showing an increase in 1849 of 123,608 barrels and 2074 half barrels over 1848.

The inspections of Rye Flour and Corn Meal were as follow:

	1849.			1848.		
	Hhds.	Barrels.	Hf. Bbls.	Hhds.	Barrels.	Hf. Bbls.
Rye Flour	....	8,007	9	....	5,094	65
Corn Meal	428	51,772	2,051	129	45,451	1,044
Total	428	59,779	2,060	129	50,545	1,109

SOUTH CAROLINA.

COMMERCE OF CHARLESTON.

Statement of Exports from the District of Charleston, of the Growth, Produce, and Manufacture of the United States, in American and Foreign Vessels, for the Year 1849.

Whither exported.	Boards, Plank, &c.	Naval Stores.	Cotton. Sea Island.	Cotton. Other.	Rice.	Rough Rice.	Miscellaneous Articles.	Total to each Country.
	Feet.	Bbls.	lb.	lb.	Tcs.	Bush.	$	$
Russia	...	...	...	1,362,366	1,358	89,043	...	132,419
Sweden	14,415	...	...	693,704	457	59,889	...	125,271
Denmark and Norway	16,484	...	...	4,779	...	400	...	54,963
Holland	10,602	...	...	1,385,611	4,608	70,543	...	198,341
Belgium	106,705	...	...	3,147,988	2,835	235,216	...	382,829
England	581,382	14,254	4,176,711	66,525,252	11,721	...	12,739	6,490,178
Scotland	...	...	21,294	1,884,854	7	...	87	136,745
Gibraltar	80,366	...	...	...	260	...	...	5,966
British West Indies	316,400	...	...	...	1,011	16,000	5,647	28,779
Hanse Towns and Germany	131,429	1,569	...	2,213,651	12,789	21,721	...	482,566
France on the Atlantic	96,746	...	1,766,705	13,827,584	4,027	...	...	1,460,381
Spain on the Mediterranean	11,091	34	...	4,773,027	...	...	...	413,277
Honduras	71,757	...	...	...	...	...	...	1,090
Cuba	1,584,050	81	...	...	19,040	...	10,221	885,101
Italy and Malta	2,631	...	...	563,845	...	...	...	61,071
Trieste and other Austrian ports	...	...	...	267,011	...	...	...	18,640
Brazilian ports	60,110	...	...	...	...	...	...	1,046
Buenos Ayres	262,723	...	...	...	453	...	...	15,198
	3,240,032	15,938	5,964,710	96,059,122	58,561	492,812	28,644	10,343,771

COASTWISE EXPORTS.

First quarter, 1849	$1,294,363
Second quarter	1,169,972
Third quarter	1,139,536
Fourth quarter	1,890,649
Total coastwise	$5,494,520

FOREIGN EXPORTS.

In American vessels	$6,728,590
In Foreign vessels	3,615,181
Total Foreign	$10,343,771
Total Coastwise	5,494,520
Total value of Exports, Foreign and Coastwise, for the year 1849	$15,838,291

(Charleston Mercury.)

Agricultural and other Products that passed over the South Carolina Railroad, in 1849:

	COTTON.	CORN.	TUR'NE.
	Bales.	Bush.	Bbls.
From Hamburg and stations on road	141,139	56,274	6,261
From Columbia and stations on road	154,418	4,863	7,561
From Camden and stations on road	44,444	5,767	97
Total	340,001	66,904	13,919

In addition, from road generally—1,584 head of cattle, 3,353 hogs, 328 sheep, 977 horses, 1,507 barrels of flour, and 10,632 bales of domestics.

In publishing this statement, we would call the special attention of our readers to the item of 10,632 bales of domestics that have been transported over the road in one year. The amount astonished us, and, we have no doubt, will surprise most persons. It is a new feature in our resources, and must, in the natural course of events, increase with a rapidity that will astonish not only the distant consumers who will be supplied with Southern manufactures, but even our own citizens, who only recently turned their attention to this new source of wealth in the employment of their surplus labor. We grow the raw material—we have the mechanical ability, the capital, and the operatives. None can compete with us, if these advantages are used with judgment.

(Charleston Courier.)

IMPORTS INTO NEW ORLEANS FROM THE INTERIOR.

COMMENCING SEPTEMBER 1.

		1849.	1848.
Bacon, assorted	hhds. & csks.	13,501	14,955
Bacon, assorted	bbls. & bxs.	15,812	18,775
Bacon, Hams	hhds. & tcs.	6,103	8,138
Bacon, in bulk	lb.	70,100	130,000
Bagging	pcs.	25,176	29,276
Bale Rope	coils,	35,315	36,522
Beans	bbls.	7,094	8,435
Butter	kegs & firkins,	30,426	35,740
Butter	bbls.	1,332	1,629
Beeswax		207	186
Beeswax	lb.		
Beef	bbls.	36,616	31,229
Beef	hhds. & tcs.	12,534	24,132
Beef, Dried	lb.	41,900	20,300
Buffalo Robes	packs,	326	9
Cotton: La. and Miss.	bales,	394,263	603,274
Cotton: Lake		7,164	10,353
Cotton: N. Ala. & Tenn.		172,551	108,795
Cotton: Arkansas		32,061	25,698
Cotton: Mobile		7,063	20,179
Cotton: Florida		6,428	2,733
Cotton: Texas		3,045	1,907

Corn Meal	bbls.	3,116	8,968
Corn, in Ear		34,702	227,946
Corn, Shelled	sacks,	565,166	1,041,313
Cheese	bxs.	44,761	38,166
Coal, Western	bbls.	294,000	101,000
Dried Apples		1,417	2,165
Dried Peaches		514	468
Feathers	bags,	4,401	2,622
Flax Seed	tcs.	158	580
Flour	bbls.	316,167	687,638
Furs	bxs. & hhds.	2	
Furs	bdls.	363	64
Hemp	bales,	9,249	10,324
Hides	No.	19,986	13,968
Horns		3,600	
Hay	bales,	36,699	31,586
Iron, Pig	tons,	20	413
Lard	hhds.	206	389
Lard	tcs. & bbls.	157,288	128,666
Lard	kegs,	219,308	189,688
Lime, Western	hhds. & bbls.	7,846	2,692
Lead	pigs,	128,595	193,186
Lead, Bar	kegs & bxs.	274	437
Lead, White	kegs,	5,124	4,511
Molasses	bbls.	139,662	102,150
Oats	bbls. & sacks,	158,236	140,185
Oil, Linseed	bbls.	658	1,009
Oil, Castor		1,337	1,394
Oil, Lard		8,109	4,283
Oil, Cake	tons,	1,032	2,467
Potatoes	bbls.	123,512	98,634
Pork	bbls. & tcs.	416,662	398,056
Pork	bxs.	17,784	18,654
Pork	hhds.	11,926	15,473
Pork, in bulk	lb.	10,811,360	5,618,680
Skins, Deer	packs,	631	587
Shot	kegs,	2,677	2,605
Soap	bxs.	6,400	4,351
Staves	M.	1,734	542
Sugar	hhds.	103,264	80,054
Sugar	bbls.	5,191	2,371
Spanish Moss	bales,	911	1,394
Tallow	bbls.	4,368	5,021
Tobacco, Leaf	hhds.	11,667	8,036
Tobacco, Chewing	kegs & bxs.	828	1,870
Tobacco	bales,	81	19
Wool	bags,	554	433
Whiskey	bbls.	64,054	74,082
Wheat	bbls. & sacks,	42,079	165,565

IMPORTS OF FOREIGN MERCHANDISE.

COMMENCING SEPTEMBER 1.

			1849.	1848.
Coffee—	Cuba, &c.	bags,	13,736	6,234
	Rio		126,908	218,672
Sugar—	Havana	bxs.	4,873	10,527
	Havana	hhds.		18
Salt—	Liverpool	sacks,	266,461	327,743
	Turks Island, &c.	bush.	504,700	119,088

(*N. O. Price Current, March* 6.)

In the above table, the falling off in the receipts of wheat, corn, flour, and meal, is the most noticeable feature. In 1848 there arrived at New Orleans 62,694 barrels of corn in the ear; in 1849 only 4,850. Corn meal fell from 4,395 barrels down to 477. Shelled corn in sacks fell from 710,558, to 325,973. In flour, the diminution was from 504,485 barrels in 1848 to 263,635 in 1849. Wheat in 1848 was 134,052 sacks, and in 1849 only 41,894. In oats and potatoes there is an increase. Pork in bulk shows a very large increase, being 51,000 lbs. in 1848, and 900,000 in 1849.

There is a large falling off in Louisiana and Mississippi Cotton. In Hay the increase is over 25 per cent.; in Lead the receipts are less, by more than 60,000 lbs. than the quantity arrived in 1849. Lead, and several other products of the Upper Valley of the Mississippi, particularly those of Wisconsin, Illinois, Indiana, and Ohio, seem inclined to seek the seaboard by the Northern Lakes. The receipts of Sugar increased over 11,000 hogsheads. There is a remarkable falling off in the quantity of Rio Coffee that entered the port of New Orleans in 1849, as compared with that of 1848. Her imports by the river for several years past, are thus set down:—

Year.	Produce Arrived.	Export of Produce.
1842	$45,716,045	$27,427,422
1843	53,728,054	26,653,924
1844	65,863,866	29,442,734
1845	57,199,122	25,841,311
1846	77,193,464	30,747,533
1847	90,033,256	41,788,303
1848	79,779,151	39,348,722

Here we find, from September 1st, 1845, to September 1st, 1847, an annual increase of western produce received at New Orleans, of 17 per cent.

The steamboat tonnage of New Orleans in 1842, as compared with other western cities, was as follows:—

Cities.	Tons.
New Orleans	80,993
St. Louis	14,725
Cincinnati	12,025
Pittsburgh	10,107
Louisville	4,618
Nashville	3,810

The steamboat tonnage of this city cannot now be less than 100,000 tons. What the ocean tonnage is, we cannot determine.

This port shipped staples of the North, for 1845–6 and 1846–7, to the following amounts:—

Flour.—1845–6, 573,194 barrels; 1846–7, 1,319,507 barrels.
Pork.—1845–6, 272,319 barrels; 1846–7, 280,520 barrels.
Bacon.—1845–6, 21,042 hogsheads; 1846–7, 25,904 hogsheads.
Lard.—1845–6, 790,904 kegs; 1846–7, 907,977 kegs.
Beef.—1845–6, 58,162 barrels; 1846–7, 51,906 barrels.
Lead.—1845–6, 718,285 pigs; 1846–7, 624,258 pigs.

Louisiana contains 45,350 square miles, or 29,024,000 acres. More than half this extent is unentered land and as good as any country can boast. The agricultural resources of Louisiana have scarcely begun to be developed, and she has room for a great increase in production and population for many years to come.

The following table exhibits the exports of cotton and tobacco from New Orleans, for the past twenty-six years:

Year.	Cotton in bales.	Tobacco in hogsheads.
1823	171,872	28,624
1824	143,843	25,910
1825	203,914	16,849
1826	250,681	18,231
1827	326,516	26,140
1828	304,073	35,098
1829	267,736	25,288
1830	351,237	28,028
1831	423,942	33,872
1832	358,104	35,056
1833	410,524	23,637
1834	461,026	25,210
1835	536,991	33,831
1836	490,495	41,604
1837	588,969	35,821
1838	738,313	35,555
1839	579,179	30,852
1840	749,320	40,436
1841	821,288	54,667
1842	949,320	68,058
1843	1,088,870	89,891
1844	895,375	81,249
1845	984,616	68,679
1846	1,054,857	62,045
1847	724,508	50,376
1848	1,201,897	60,364
26 years	14,877,413	1,085,771

Here is an export of 14,877,413 bales of cotton in twenty-six years. The total receipts for this period, were 15,134,541 bales, which, at $40 per bale, amount to $605,383,600. There was also exported 1,078,735 hhds. of tobacco, which amounts to $15,511,450, at $70 per hhd.—making a total of these two leading articles, of $680,895,050.

COMMERCE OF THE NEW YORK CANALS.

The cholera operated to check the movement of agricultural products on the Northern Lakes, and consequently on the Erie and Oswego Canals, some two months of the seven in which they were navigable, in 1849. Had it not been for this calamity, they would exhibit a much larger business. As it is, the aggregate is very respectable. We are indebted to the Albany Evening Journal for the following synopsis:—

Statement showing the Total Quantity of each Article which came to the Hudson River, on all the Canals, during the Years 1848 *and* 1849.

		1848.	1849.
THE FOREST.			
Fur and Peltry	lb	556,816	554,531
Product of Wood.			
Boards and scantling	ft.	262,279,116	297,431,140
Shingles	M.	104,270	51,258
Timber	cubic ft.	1,510,777	1,497,627
Staves	lb.	114,246,000	154,159,369
Wood	cords,	13,861	11,977
Ashes	bbls.	38,229	25,490
AGRICULTURE.			
Product of Animals.			
Pork	bbls.	87,930	73,985
Beef		60,570	105,419
Bacon	lb.	8,182,000	8,577,754
Cheese		43,280,000	42,097,818
Butter		23,730,000	20,880,409
Lard		9,926,000	9,083,062
Wool		8,534,000	12,731,402
Hides		176,000	596,364
Vegetable Food.			
Flour	bbls.	3,131,095	3,263,087
Wheat	bush.	9,116,134	2,734,389
Rye		286,919	322,942
Corn		2,933,963	5,121,270
Barley		1,548,197	1,400,194
Other grain		2,077,724	2,407,895
Ship stuffs		1,437,487	2,022,081
Peas and beans		75,808	160,234
Potatoes		115,629	242,211
Dried fruit	lb.	1,828,000	780,369

All other Agricultural Products.

		1848.	1849.
Cotton	lb.	174,400	316,094
Tobacco		352,000	1,796,056
Grass seed		1,666,000	2,479,098
Flax seed		1,764,000	1,381,684
Hops		1,598,000	1,877,805

MANUFACTURES.

Domestic spirits	galls.	1,606,181	2,107,598
Leather	lb.	4,540,000	5,532,610
Furniture		1,548,000	1,116,800
Bar and pig lead		86,000	11,167
Bloom and bar iron		11,528,000	27,906,016
Pig iron		29,788,000	9,636,166
Iron ware		2,314,000	1,737,690
Domestic woollens		1,104,000	1,055,519
Domestic cottons		2,498,010	2,498,425
Salt	bush.	343,618	283,333

Other Articles.

Stone, lime, &c	lb.	65,246,000	45,477,071
Gypsum		3,718,000	2,551,600
Mineral coal		48,292,000	25,169,939
Sundries		97,798,000	111,810,700

Statement showing the Aggregate, in Tons, under the Divisions specified in the above Table.

		1848.	1849.
The Forest	tons,	603,272	664,117
Agriculture		685,896	769,602
Manufactures		44,867	44,286
Merchandise		6,343	5,872
Other articles		107,527	96,195
Total	tons,	1,447,905	1,580,072

Statement showing the Estimated Value of each Article which came to the Hudson River, on all the Canals, during the Years 1848 and 1849.

THE FOREST.

	1848.	1849.
Fur and Peltry	$695,838	$692,864
Product of Wood.		
Boards and scantling	$3,931,277	$4,459,158
Shingles	338,861	153,774
Timber	212,598	119,608
Staves	514,109	693,702
Wood	69,462	56,892
Ashes	1,146,870	479,675

AGRICULTURE.

Product of Animals.

Pork	$967,230	$758,421
Beef	505,700	1,244,360
Bacon	490,997	514,665
Cheese	3,029,169	2,736,212
Butter	3,359,891	2,923,831
Lard	761,757	635,814
Wool	2,303,044	4,072,358
Hides	17,494	59,636

Vegetable Food.

Flour	$17,471,401	$16,315,435
Wheat	3,677,020	2,993,161
Rye	200,310	187,545
Corn	1,834,388	2,970,482
Barley	1,037,293	868,115
Other grain	747,930	868,083
Bran and ship stuffs	172,578	242,755
Peas and beans	75,808	160,234
Potatoes	58,109	117,919
Dried fruit	164,583	78,007

All other Agricultural Products.

Cotton	$11,856	$29,239
Tobacco	43,127	237,007
Clover and grass seed	116,692	148,746
Flax seed	85,268	80,586
Hops	159,095	262,893

MANUFACTURES.

Domestic spirits	$385,871	$526,938
Leather	680,842	885,080
Furniture	153,536	111,630
Bar and pig lead	3,875	508
Bloom and bar iron	172,931	558,120
Pig iron	744,687	96,362
Iron ware	80,993	52,131
Domestic woollens	882,851	895,991
Domestic cottons	622,652	698,816
Salt	106,522	73,666

Other Articles.

Stone, lime, and clay	$92,379	$74,061
Gypsum	8,336	5,742
Mineral coal	108,659	56,638
Sundries	2,001,252	2,241,539

Statement showing the Aggregate Value of the Property which came to the Hudson River, on all the Canals, during the Years 1848 *and* 1849, *under the Divisions as specified in the above Table.*

	1848.	1849.
The Forest	$6,909,015	$8,044,646
Agriculture	37,838,290	38,058,206
Manufactures	3,884,360	3,899,287
Merchandise	598,619	508,048
Other articles	2,210,623	2,280,473
Total	$50,883,907	$51,745,219

Produce Delivered at New Orleans and on the Hudson, and Exported from the United States.

The following table will show the arrivals of produce at New Orleans and on the Hudson, with the exports of the same, from the United States, for the year 1849.

	New York.	New Orleans.	Total.	Total.
Lard	$4,970,118	$635,814	$5,605,927	
Bacon	2,989,385	514,065	3,504,050	$9,245,885
Pork	6,621,911	758,421	7,370,332	
Beef	1,049,437	1,244,360	2,293,797	2,058,358
Cheese	162,867	2,736,212	2,899,079	1,654,157
Butter	131,740	2,928,831	3,055,571	
Flour	4,559,296	16,315,434	20,874,731	11,180,282
Wheat	477,822	2,933,161	3,410,983	1,756,848
Corn	1,953,606	2,970,482	4,924,088	7,966,369
Potatoes	365,200	117,919	483,209	88,818
Indian meal	80,242		80,242	1,109,625
Total	$23,311,709	$31,150,300	$54,462,009	$35,215,117

COMMERCE OF BUFFALO.

LAKE IMPORTS

From the Opening to the Close of Navigation—1849.

BUFFALO, *Jan.* 5, 1850.

The principal articles received here via the lake, during the season of 1849, are as annexed:—

Flour	bbls.	1,207,435	Wheat	bush.	4,943,978
Pork	bbls.	59,954	Corn	bush.	3,321,651
Beef	bbls.	61,998	Oats	bush.	362,285
Seed	bbls.	21,072	Rye	bush.	5,253
Eggs	bbls.	2,806	Barley	bush.	3,050
Oil	bbls.	3,840	Lard	lbs.	5,311,037
Bacon	lbs.	5,193,906	Tallow	lbs.	1,773,650
Lumber	ft.	33,935,768	Butter	lbs.	9,714,170
Wool	bales	49,072	Ashes	casks	14,580
Meal	bbls.	6,955	High-wines	casks	38,753
Fish	bbls.	5,963	Leather	rolls	3,870
Tobacco	hhds.	2,057	Staves	No.	14,183,602
Hides	No.	62,910	Cranberries	bbls.	3,026
Lead	pigs	14,742	Hemp	bales	414
Iron	tons	3,132	Broom Corn	bales	3,755
Coal	tons	9,570	Flax	bales	37
Cotton	bales	597			

Lake Imports at Buffalo, for a Series of Years.

The principal articles received at this point via the lake, from the opening to the close of navigation, for the past three years, were as follows:—

		1847.	1848.	1849.
Flour	bbls.	1,857,000	1,249,000	1,207,435
Pork	bbls.	63,750	66,000	59,954
Beef	bbls.	38,900	53,812	61,998
Seed	bbls.	22,536	22,020	21,072
Bacon*	lbs.	....	....	5,193,996
Lumber	ft.	17,313,000	21,425,000	33,935,768
Wool	bales	20,223	40,024	49,072
Fish	bbls.	3,948	6,620	5,906
Tobacco	hhds.	1,114	885	2,057
Hides	No.	64,280	70,750	62,910
Lead	pigs	16,748	27,958	14,742
Pig iron	tons	3,857	4,132	3,132
Coal	tons	7,716	12,950	9,570
Hemp	bales	1,062	865	414
Wheat	bush.	6,489,100	4,520,117	4,943,978
Corn	bush.	2,862,800	2,298,100	3,321,651
Oats	bush.	446,000	569,000	362,285
Rye	bush.	70,787	17,809	5,253
Lard	lbs.	3,486,000	5,632,112	5,311,037
Butter	lbs.	5,079,300	6,878,000	9,714,170
Tallow	lbs.	....	....	1,773,560
Tallow	bbls.	3,015	4,490	
Ashes	casks	7,388	9,940	14,580
High wines	casks	18,100	38,700	38,753
Leather	rolls	4,960	3,313	3,870
Staves	No.	3,800,000	3,091,000	14,183,602

* In 1847 and 1848 included in Pork.

(*Buffalo Com. Adv.*)

Statement of Property Cleared and Left at Buffalo, by Canal, during the Season of 1849.

ARTICLES.	CLEARED. TOTALS. 1849.	CLEARED. TOTALS. 1848.	PROPERTY LEFT. 1849.
Furs and peltry ... lbs.	1,188,096	458,970	16,208
Boards and scantling ... ft.	38,548,407	28,747,535	5,475,135
Shingles ... M.	615	2,706	80
Timber ... cubic ft.	12,741	21,861	44,406
Staves ... lbs.	124,254,959	87,477,088	21,500
Wood ... cords	159	52	17,357
Ashes ... bbls.	14,844	13,690	20
Pork ... bbls.	41,648	67,076	308
Beef ... bbls.	59,441	43,190	
Bacon ... lbs.	4,879,058	7,248,347	1,200
Cheese ... lbs.	9,634,685	9,452,984	12,766
Butter ... lbs.	6,590,552	7,036,601	3,401
Lard ... lbs.	4,844,725	6,056,470	
Wool ... lbs.	8,640,409	5,883,856	6,270
Hides ... No.	842,442	420,303	1,758,587
Flour ... bbls.	1,034,938	1,241,870	10,142
Wheat ... bush.	3,940,350	8,978,440	11,781
Rye ... bush.	4,410	2,857	
Corn ... bush.	3,328,468	2,187,562	1,020
Barley ... bush.	859	24,255	45,802
Other grain ... bush.	846,188	288,277	10
Bran and ship stuffs ... bush.	58,280	128	119,726
Peas and beans ... bush.	1,040	4,741	
Potatoes ... bush.	1,022	7,533	5,288
Dried fruit ... lbs.	102,557	205,214	46,407
Cotton ... lbs.	136,015		
Tobacco ... lbs.	1,601,360	254,595	240,139
Clover and grass seed ... bush.	2,510,893	1,546,187	10,177
Flax seed ... bush.	556,188	2,755,107	
Hops ... lbs.	8,035	...	272,145
Domestic spirits ... galls.	1,301,112	1,839,437	2,130
Leather ... lbs.	565,358	486,096	237,052
Furniture ...	855,130	1,210,890	8,243,936
Bar and pig lead ... lbs.	99,352	94,171	3,173
Pig iron ... lbs.	70,000	129,306	1,098,866
Bloom and bar iron ... lbs.	116,259	81,228	1,123,675
Iron ware ... lbs.	28,591	352,500	5,813,896
Domestic woollens ...	26,621	27,618	400
Domestic cottons ...	19,938	82,326	38,779
Salt ... bush.	...	...	1,070,155
At 8 mills ... lbs.	311,302	186,563	108,125,784
Sugar ... lbs.	13,030	20,263	12,665,181
Molasses ... galls.	8,050	1,180	11,172,433
Coffee ... lbs.	...	...	5,843,552
Nails and spikes ... lbs.	128,181	122,614	5,605,308
Iron and steel ... lbs.	75,038	44,474	9,198,711
Crockery ...	81,541	1,900	11,162,716
Oysters and clams ...	600	...	933,018
Stone, lime, and clay ...	4,411,052	2,594,346	37,582,629
Gypsum ...	...	...	3,600
Mineral coal ...	2,900,300	6,899,000	13,367,595
Sundries ...	19,000,864	21,719,261	2,391,791

Tolls in 1849 ... $757,491.36
Tolls in 1848 ... 672,619.09

Increase ... $84,872.27

TRADE OF TOLEDO.

List of Imports and Exports, and their Value, for the Port of Toledo, 1849.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
	Barrels.			*Pounds.*	
Ale and beer ...	465	$2,035	Grind stones ...	157,584	$3,152
Beef ...	2,235	17,800	Gypsum ...	101,896	509
Flour ...	142,452	553,675	Glass ware, &c. ...	859,056	89,762
Fish (fresh water) ...	2,227	13,382	Hemp ...	80,230	7,220
Fish (salt water) ...	747	5,976	Hides and skins ...	55,502	4,440
Linseed oil ...	1,878	31,816	Hops ...	96,224	17,320
Lard oil ...	2,902	60,128	Hogs' hair ...	261,074	52,215
Pork ...	7,614	300,888	Ice ...	640,000	6,400
Salt ...	85,005	97,755	Iron ...	415,865	18,814
Whiskey ...	16,449	107,508	Iron (cast) ...	1,063,516	53,176
Domestic spirits ...	628	4,082	Lard ...	5,659,241	339,735
Meal ...	8,888	7,776	Lead ...	16,675	1,000
	Bushels.		Leather ...	719,229	107,884
Bran ...	19,637	981	Machinery ...	444,374	22,219
Barley ...	24,272	13,136	Merchandise ...	1,148,031	5,151,600
Corn ...	2,052,671	841,349	Marble (unwrought)	941,309	47,065
Coal ...	4,106	410	Marble (wrought) ...	117,189	1,171
Potatoes ...	1,170	292	Molasses ...	1,291,780	86,752
Oats ...	18,833	5,649	Nails and spikes ...	257,626	12,881
Rye ...	1,088	544	Oil cake ...	5,404,225	27,021
Clover seed ...	3,776	11,428	Potters' ware ...	119,659	2,393
Other grass ...	2,435	3,052	Paper ...	188,525	22,625
Flax seed ...	5,249	4,199	Powder ...	193,306	77,358
Wheat ...	715,546	715,546	Pots and pearls ...	840,297	42,015
			Shot ...	43,610	2,617
Agricultural imple-	*Pounds.*		Saleratus ...	48,602	2,916
ments ...	128,566	64,280	Starch ...	436	40
Butter ...	288,640	28,864	Sugar ...	1,925,092	115,506
Burr blocks ...	19,929	996	Tallow ...	469,236	33,539
Extra baggage ...	814,624	400,000	Tobacco (leaf) ...	1,877,849	112,641
Bacon and pork in			do. (manufactured)	132,495	19,874
bulk ...	7,312,887	365,644	Wool ...	185,033	46,408
Cheese ...	968,988	50,139	Wooden ware ...	92,577	11,571
Coffee ...	1,079,253	85,340	West India fruits ...	22,242	2,224
Cotton (raw in bales)	221,442	17,715	White lead ...	29,230	2,046
Cotton yarn ...	2,425	596	Sundries ...	447,884	1,791,200
Cordage ...	29,034	3,629	Animals ...	2,369	47,880
Copper ...	48,461	9,692	Empty barrels ...	415	125
Candles (lard) ...	218,148	54,587	Brooms ...	410	41
Cut stone ...	55,869	280	Lath ...	617,000	617
Clocks ...	125,683	37,704	Split and flat hoops ...	44,000	150
Crockery ...	353,837	70,668	Staves and heading ...	118,624	22,724
Dye stuffs ...	26,040	5,208	Shingles ...	6,781,250	18,813
Eggs ...	12,261	370	Wagons ...	135	6,750
Dried fruit ...	97,770	58,662	Lumber ...	3,784,986	37,850
Undried fruit ...	121,982	1,824	Timber ...	2,458	245
Feathers ...	126,945	29,236	Wood ...	472	708
Furs and peltries ...	145,047	72,524	Stone ...	26¼	100
Ginseng ...	70,013	19,612	Mill stones ... pairs	14	8[illegible]0
Grease ...	1,520,900	76,045			

Total Value ... $12,0[illegible]9,789

TRADE OF OSWEGO.

The total value of the foreign and domestic imports at Oswego, for the year 1849, as we learn from an article in the Oswego Times, was $8,100,279. The following table will compare the quantities of some of the leading articles of importations with those of the previous years.

	1848.	1849.
Lumber.........feet	84,829,826	51,101,432
Wheat.........bushels	3,642,633	3,613,677
Corn.........bushels	873,135	383,230
Barley.........bushels	181,569	65,256
Rye.........bushels	51,565	31,426
Oats.........bushels	63,136	133,697
Flour.........barrels	89,702	317,758
Beef.........barrels	3,751	20,375
Pork.........barrels	29,973	31,098
Wool.........pounds	198,642	437,761
Butter.........pounds	2,712,631	1,960,760
Cheese.........pounds	5,281,712	2,601,100
Lard.........pounds	4,127,514	4,177,950
Hams.........pounds	512,648	2,864,618

The total value of imports from Canada was $2,214,447. The imports of Canadian flour in 1848 were only 50,000 barrels, and of wheat 60,000 bushels; while in 1849 the imports of flour reach 198,623 barrels, and of wheat 632,930 bushels.

Shipments from Toledo to Oswego, during the Season of 1849.

Wheat	bushels	495,020
Corn	bushels	186,690
Pork	barrels	26,227
Bacon	pounds	3,212,320
Lard and grease	pounds	3,991,373
Pot and pearlash	pounds	813,032
Flour	barrels	10,043
Whiskey	barrels	965
Corn meal	barrels	200
Beef	barrels	725
Oil	barrels	193

January 17, 1850.

We take great pleasure in furnishing our readers to-day with the value of the exports and imports of our port, for the season of 1849. By contrasting this with the valuation of last year, which was little more than $8,000,000, it will be perceived that the increase has been rather over 33⅓ per cent. No tables of valuation and quantity have been furnished by any of the other ports, for the past year, that we have seen, and we cannot, therefore, speak with accuracy as to the comparative commercial importance of the several ports; but we hazard nothing in saying, that no port west of Buffalo, adopting the same standard of computation, can furnish so large an amount as ours. Cleveland, as we are informed upon good authority, is less than $12,000,000. Sandusky and Detroit, we know to be very much under those figures.—(*Toledo Blade.*)

BUSINESS OF THE PORT OF ERIE.

The Erie Gazette furnishes the following statement of the Shipments and Receipts at this port, during the year 1849:—

SHIPMENTS.

Wool.........lbs.	1,296,878	Coal.........tons	81,000
Butter.........lbs.	1,176,249	Railroad iron.........tons	552
Lard.........lbs.	28,503	Pig-iron.........tons	1,654
Cheese.........lbs.	1,084,610	Pork.........bbls.	904
Leather.........lbs.	88,851	Cider.........bbls.	110
Starch.........lbs.	121,672	Beef.........bbls.	114
Iron, bar, &c.........lbs.	1,823,183	Ashes.........casks	590
Feathers.........lbs.	1,103	Nails.........kegs	19,650
Glass.........lbs.	141,149	Lumber.........feet	10,242,260
Glass ware.........lbs.	450,414	Shingles.........M.	425
Hemp.........lbs.	12,672	Bark.........cords	1,518
White lead.........lbs.	8,112	Paper.........reams	5,100
Hops.........lbs.	3,565	Sheep pelts.........bbls.	469
Oil cake.........lbs.	9,810	Scythe snaths.........dozens	1,512
Oil cloth.........lbs.	196,712	Rakes.........	961
Corn.........bush.	10,518	Staves.........	1,512,622
Oats.........bush.	17,848	Gun stocks.........	33,900
Barley.........bush.	5,611	Hoop poles.........	269,300
Seeds.........bush.	684	Oars.........	18,111
Dried fruit.........bush.	3,863	Chestnuts.........bush.	1,225
Stoves and hollow ware.........lbs.	1,858,161	Merchandise & furniture..lbs.	1,828,183

RECEIPTS.

Merchandise.........lbs.	9,683,712	Wheat.........bush.	18,913
Flour.........bbls.	15,426	Iron ore.........tons	410
Salt.........bush.	26,667	Lehigh coal.........tons	400
Fish.........lbs.	5,983	Plaster.........tons	572
Water lime.........	120	Limestone.........cords	349
Fire-proof paint.........lbs.	92		

TRADE OF VERMILLION, OHIO.

The following are the Imports and Exports at this port, for the year 1849, as furnished by the Collector:—

IMPORTS.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Merchandise ....tons	237	$80,871	Coal (Lehigh)....tons	158	$1,580
Flour ....barrels	120	540	Shingle wood...cords	40	200
Salt ....barrels	1,986	1,986	Shingles ....M.	272	680
Gravel ....tons	200	200	Lumber ....feet	91	728
Total Value					$86,785

EXPORTS.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Flour ....barrels	4,553	$20,448	Oats ....bush.	8,144	$2,032
Feathers ....lbs.	310	94	Corn..............bush.	24,456	10,270
Wool ....lbs.	102,726	30,817	Hogshead and pipe staves ....M.	395$\frac{1}{2}$	9,597
Cheese ....lbs.	23,494	1,174	Ashes ....casks	272	6,590
Grindstones ....tons	189$\frac{1}{2}$	1,106	Wood ....cords	568	656
Dried fruit ....bbls.	910	1,864	Wine...............cask	1	75
Eggs..................bbls.	1	10	Hickory nuts...bush.	50	50
Smoked hams ....lbs.	850	51	Black walnut lumber ....M. ft.	206	398
Lard..............barrels	15	299	Stoves ....tons	64$\frac{1}{4}$	4,682
Lard ....firkins	21	105	Barley ....bush.	903	451
Butter ....firkins	270	2,270	Flag stone.......M. ft.	18$\frac{1}{2}$	1,113
Timothy seed...bbls.	5	37	White wood lumber "	41	410
Pork ....bbls.	398	3,807			
Wheat...............bush.	28,060	22,811			
Total Value					$121,175

COMMERCE OF HURON, OHIO.

IMPORTS.

Articles.	Quantity.	Value.
Merchandise ....packages	1,974	$29,640
Merchandise ....tons	250	500,000
Iron ....tons	221	17,500
Nails....................kegs	484	2,120
Rice ....barrels	50	250
Oil ....barrels	68	1,360
Glass ....boxes	260	800
Ground lead....................kegs	500	878
Crockery ....crates	89	8,900
Hollow ware ....tons	18	1,200
Salt....................barrels	2,220	2,670
Sugar ....hogsheads	156	1,238
Stoves....................	196	2,940
Furniture ....boxes	30	1,400
Oakum....................barrels	40	2,800
Pine lumber (clear)....................M. feet	5	75
Pine lumber (common)....................M. feet	245	2,450
Shingles ....M.	449	1,610
Shingle wood ....cords	58	371
Cooper wood....................cords	14	42
Total Value		$575,165

EXPORTS.

Articles.	Quantity.	Value.
Wheat....................bushels	885,589	$802,250
Corn ....bushels	188,801	55,552
Oats....................bushels	63,728	1,911
Timothy seed....................bushels	1,489	1,861
Clover seed....................bushels	3,208	11,548
Flaxseed....................bushels	1,418	1,418
Flour....................barrels	6,904	27,616
Pork ....barrels	3,360	33,600
Beef ....barrels	1,743	18,944
High wines....................barrels	2,672	34,202
Ashes....................casks	791	18,858
Lard ....barrels	433	6,221
Butter....................kegs	618	6,180
Wool ....bales	555	20,818
Sheep pelts....................	560	14,000
Feathers....................	56	1,780
Leather ....rolls	28	840
Broom corn....................bales	175	875
Tallow ....barrels	161	8,475
Hides....................	457	1,141
Cheese ....casks	29	522
Live hogs....................	6,319	31,595
Staves ....M.	1,931	48,275
Dried apples....................bushels	392	382
Dried peaches....................bushels	119	297
Walnut lumber....................feet	78,908	1,185
Rags....................pounds	5,000	75
Eggs....................barrels	290	2,900
Furs....................boxes	9	900
Total Value....................................		$689,157

STATISTICS OF MICHIGAN.

We are indebted to the Hon. George W. Peck, Secretary of State, for a copy of his Report on the Statistics of Michigan, for 1849, of which the following is a synopsis:—

Comparative Statement of the Number of Sheep and the Quantity of Wool raised in the several Counties in Michigan, as taken from the Census of 1840, *and the Returns of the Assessors for* 1849.

Counties.	Number of Sheep.		Pounds of Wool.	
	1840.	1849.	1840.	1849.
Allegan	107	6,068	239	15,972
Barry	86	6,500	265	14,569
Berrien	2,407	6,889	1,959	16,816
Branch	744	16,557	1,692	38,831
Calhoun	8,957	37,246	8,676	98,006
Cass	5,524	16,335	10,481	43,859
Chippewa	14	....	39	
Clinton	294	4,878	215	13,184
Eaton	103	8,068	104	24,967
Genesee	1,007	18,393	1,802	33,724
Hillsdale	1,804	24,326	3,745	55,382
Ingham	172	9,641	306	24,538
Ionia	270	7,524	345	10,891
Jackson	3,920	45,428	4,225	128,180
Kalamazoo	3,694	31,966	4,862	94,830
Kent	222	6,724	566	16,675
Lapeer	1,197	11,309	1,250	30,318
Lenawee	6,031	52,008	7,429	150,702
Livingston	1,903	25,621	3,945	66,366
Macomb	8,959	27,569	18,057	72,616
Mackinac	6	8		
Monroe	3,010	18,781	3,786	53,053
Oakland	19,656	82,141	33,859	218,536
Ottawa	....	120	....	295
Saginaw	....	752	....	2,050
Shiawassee	375	7,030	584	18,843
St. Clair	1,075	7,575	1,909	20,908
St. Joseph	3,986	20,988	4,298	54,979
Van Buren	528	5,146	900	16,667
Washtenaw	19,273	72,373	29,427	213,485
Wayne	10,181	30,691	19,349	84,567
Total	99,618	610,568	153,375	1,645,756

FLOURING MILLS IN MICHIGAN.

The statistics, taken for the year 1849, give the following results of the Flour Mills in our State. It is to be presumed they are nearly correct.

Counties.	Number of Mills.	Runs of Stone.	Barrels Flour made last year.	Number of hands employ'd	Capital Invested.
Allegan	3	7	2,000	3	$11,100
Barry	1	2	150	2	3,000
Berrien	4	13	12,500	10	29,000
Branch	5	16	18,900	15	52,000
Calhoun	15	44	76,300	37	131,200
Cass	4	9	6,940	3	3,800
Chippewa					
Clinton	2	4	315	4	9,000
Eaton	4	9	3,800	9	8,300
Genesee	10	23	16,591	19	43,600
Hillsdale	6	15	21,500	23	62,000
Ingham	4	6	4,900	9	19,500
Ionia	4	7	2,100	8	16,500
Jackson	13	31	24,100	33	64,500
Kalamazoo	13	29	45,682	34	76,800
Kent	8	13	16,650	11	34,600
Lapeer	8	15	3,500	10	22,000
Lenawee	17	54	54,175	24	162,700
Livingston	11	26	33,875	24	62,500
Mackinac					
Macomb	11	27	31,700	11	46,500
Monroe	6	14	7,300	14	32,600
Oakland	26	65	97,520	65	112,900
Ottawa					
Saginaw	2	2	....	1	900
Shiawassee	3	7	18,500	9	26,000
St. Clair	4	6	1,900	11	24,200
St. Joseph	12	33	51,050	61	181,800
Van Buren	1	3	1,000	2	2,000
Washtenaw	18	57	140,400	100	153,900
Wayne	18	81	84,130	36	157,000
Total	228	568	719,478	598	$1,496,400

Comparative Table, showing certain Statistical Returns made for the State of Michigan, with the Census of 1840, *compared with similar Returns of Assessors, made in* 1849.

	1840.	1849.
Bushels of Wheat raised	2,157,108	4,739,300
Bushels of all other grains	4,666,720	8,179,767
Pounds of Wool	153,375	1,645,756
Pounds of Maple Sugar made	1,329,784	1,774,369
Number of Horses	30,144	52,305
Number of Neat Cattle	185,190	210,268
Number of Swine	235,890	152,541
Number of Sheep	99,618	610,568
Saw Mills	491	730
Flouring and Grist Mills	190	228
Barrels of Flour made	202,860	719,478
Men employed in Saw and Flouring Mills	1,114	2,557

IMPORTS AND EXPORTS—DETROIT CUSTOM HOUSE.

Imports and Exports from the District of Detroit to Canada, from the 1st October to 31st December, 1849.

Imports of goods in American vessels	$40,469.05
Imports of goods in Foreign vessels	40,469.05
Exports of foreign goods in American vessels	658.77
Exports of foreign goods in Foreign vessels	1,111.79
Exports of domestic produce in American vessels	12,002.00
Exports of domestic produce in Foreign vessels	33,225.34

Tonnage of—	No.	Tons.	Crew.
American vessels entered coastwise	484	158,266	6,934
Foreign vessels entered coastwise	113	16,495	1,216
American vessels cleared coastwise	497	161,080	7,425
Foreign vessels cleared coastwise	108	14,117	1,099
American vessels cleared foreign countries	5	238	16
American vessels entered foreign countries	2	180	10

Number of acres of improved land in the State in 1848, 1,487,459½. Number sown with wheat, 465,900½. Average of wheat per acre, 10 $\frac{172}{1000}$ bushels.

Counties.	Acres improved land, 1848.	Acres sown with wheat, 1848.	Bushels per acre.	Bushels harvested in 1849.
Allegan	12,054	2,885	10¾	30,878
Barry	16,875	5,700½	10¾	60,962
Berrien	19,746½	5,611½	7½	41,514½
Branch	46,279	16,465	7½	124,779
Calhoun	96,399	37,086	10	370,478
Cass	59,197	17,960	8¼	147,637
Chippewa	219	none.	......	none.
Clinton	14,733½	5,207	11¾	61,128
Eaton	16,657½	4,845	12½	60,027½
Genesee	81,608	18,817½	6¾	126,819½
Hillsdale	56,644	18,798	9	178,648
Ingham	25,631	8,640	9½	82,994
Ionia	23,236	8,802	11¼	94,504
Jackson	119,124½	47,832	11¼	540,280
Kalamazoo	64,415	20,065	11	222,839
Kent	25,227½	9,064	10¼	92,583
Lapeer	29,560½	8,708½	12½	109,962
Lenawee	104,877½	28,281	10½	295,462
Livingston	69,762	26,988	10	268,789
Mackinac	844	none.	......	none.
Macomb	65,460	11,381	15½	175,694
Monroe	41,499	10,728	9¼	98,692
Oakland	170,808	49,812	11½	557,587
Ottawa	1,230½	271	18½	5,412
Saginaw	1,930	426	13	5,638
Shiawassee	20,824	7,908	10½	84,490
St. Clair	17,894½	1,956	17½	34,471
St. Joseph	84,255	31,690	8¼	260,616
Van Buren	16,501½	6,064½	6¾	41,881
Washtenaw	135,589	44,971	10½	468,615
Wayne	60,254	9,536	10½	104,038
Total	1,487,459½	465,900½	......	4,739,299½

The above statistics are exceedingly interesting; and the State of Michigan is entitled to the honor of having carried her statistical inquiries in reference to Wheat culture farther than any other State, if these are to be repeated every year, as they should be. Very few would have believed, without the evidence of the farmers themselves, that there were only four counties in the State which produced thirteen bushels and over per acre; yet the official returns reveal this instructive fact. It is very possible that the harvest of 1849 was less than an average, and the returns of five or ten successive years are necessary to speak with confidence on this subject.

There are several counties in which too much land is in wheat for the highest profit of its cultivators. Thus, Genesee has but 81,608 acres of improved land, of which 18,798 were sown with wheat in the autumn of 1848. These wheat fields gave less than *seven* bushels per acre on an average. One-third of the land ought to yield the same quantity of grain, i. e. 20 or 21 bushels per acre.

It is much to the credit of the farmers of Genesee that they have increased their sheep from 1007 in 1840, to 18,393 in 1849. By reducing the number of acres annually ploughed for wheat one-half, the land so saved would keep 36,000 sheep at four to the acre. Allowing one-half the manure from these to be applied to the 9,000 acres devoted to Wheat culture, it is safe to say that the harvest would be double what the land in Genesee county now yields. This is not a mere *theory* which we are recommending; it is the *practice* of the best wheat-growers in England, who so manage their sheep as to make their manure yield a return of 35 bushels of wheat per acre. This is what we desire to see accomplished, as it can be, in the States of Michigan and Ohio. The writer passed through both of these States on an agricultural tour in September, 1849; and from what he then saw, as well as from an acquaintance of twenty years previous, he has a just estimate of their extraordinary agricultural capabilities.

To show the rapid progress and improvement in wool-growing in Michigan, we ask attention to the following facts: 99,618 sheep in 1840 clipped only 153,375 pounds of wool, being but a fraction over 1½ lbs. a head; while 610,563 sheep in 1849 gave 1,645,756 lbs., being over 2½ lbs. The average gain in wool is over a pound a head.

It will be easy to double the number of sheep in ten years more, and add another pound per head, on an average, to the whole. To give an average of 3½ lbs. of wool a head, taking whole flocks together, the fleeces must weigh 4 lbs. each, as one-sixth of the sheep will be lambs, which will not be shorn.

It is to be hoped that Michigan, as well as all other States, will ascertain how many acres are planted with corn, and the yield per acre. By fixing public attention on these great industrial interests, their improvement will be rapid, sure, and universal; while the cost of collecting agricultural statistics to a limited extent, will be but trifling to each State.

STATISTICS OF IOWA.

We are indebted to the Hon. Joseph T. Fales, Auditor of State, for the following valuable abstract, which contains much useful and reliable information in a condensed form:

AN ABSTRACT FROM THE ASSESSMENT ROLLS

Of the several Counties of the State of Iowa; showing the Value of Property in the year 1849, the increased Value over the Assessment of 1848, with the Amount of Tax levied for State Purposes in the years 1848 and 1849, and the increased per cent. in the Valuation of Property over the year 1848.

No.	Counties.	Census Populat'n.	Value in 1849.	Increased Val. over 1848.	State Tax in 1848.	State Tax in 1849.	Increase per cent.
1	Allamakee	277	$11,869	$11,869	New Co.	$29 67	all
2	Appanoose	1,281	45,289	16,847	$72 85	118 22	56
3	Benton	312	31,981	8,629	68 38	79 65	37
4	Boone	*150	....	....	New Co.	No return.	
5	Buchanan	406	32,522	10,878	55 47	81 80	46
6	Cedar	3,183	486,523	49,986	1,094 16	1,215 47	11
7	Clayton	*2,600	383,110	98,015	712 73	957 77	37
8	Clinton	2,044	315,057	84,682	576 06	787 64	35
9	Dallas	635	22,293	7,939	35 88	55 78	55
10	Davis	4,939	353,000	110,526	606 18	882 50	45
11	Delaware	*1,500	143,659	31,805	280 88	359 14	27
12	Desmoines	11,649	2,046,769	219,688	3,654 16	6,140 30	‡68
13	Dubuque	9,185	1,464,781	96,380	3,421 00	3,661 95	7
14	Henry	7,829	881,377	†145,084	2,566 03	2,203 44	†14
15	Iowa	*700	43,884	19,594	60 72	109 71	80
16	Jackson	5,677	666,018	208,726	1,143 28	1,665 04	45
17	Jasper	1,223	98,707	47,783	122 43	247 27	97
18	Jefferson	8,835	865,948	162,244	1,760 75	2,170 96	23
19	Johnson	4,110	662,682	39,222	1,558 52	1,656 56	6
20	Jones	2,140	246,124	12,696	583 57	615 31	5
21	Keokuk	3,953	394,338	102,893	728 60	985 83	35
22	Lee	*16,000	2,353,040	237,896	5,287 86	5,882 60	11
23	Linn	4,762	676,152	167,296	1,272 14	1,690 38	32
24	Louisa	4,155	598,169	5,193	1,482 44	1,495 42	1
25	Lucas	*200	6,400	6,400	....	16 00	all
26	Madison	701	16,325	16,325	New Co.	40 81	all
27	Mahaska	5,559	485,098	211,670	688 55	1,212 72	77
28	Marion	3,797	275,290	80,386	487 27	688 22	41
29	Monroe	*2,000	148,200	70,080	175 80	370 50	111
30	Muscatine	4,516	933,382	268,059	608 81	2,333 45	40
31	Polk	4,633	163,538	70,437	6,282 75	408 84	75
32	Pottawattamie	6,552	68,911	†21,704	226 54	172 28	†24
33	Poweshiek	448	43,227	34,676	22 08	108 06	400
34	Scott	4,837	699,016	81,556	1,548 65	1,747 54	13
35	Van Buren	11,577	1,297,481	96,299	3,002 95	3,243 70	8
36	Wapello	7,255	882,422	406,864	1,188 95	2,206 05	85
37	Warren	644	27,007	27,007	New Co.	67 51	all
38	Washington	4,434	628,022	62,845	1,414 44	1,571 55	11
	Total	154,093	18,496,151	2,181,786	37,884 83	47,249 42	ag. 24

* Estimated. † Decrease.
‡ In 1848, 2 mills; in 1849, 3 mills.

Auditor's Office, Iowa,
Iowa City, Nov. 28, 1849.

This is to certify that the foregoing is a correct abstract of the assessed value of property within the State, and the Tax on the same for State purposes for the year 1849.

JOS. T. FALES,
Auditor of State.

Auditor's Office, Iowa,
Iowa City, November 30, 1849.

The following list exhibits the several kinds of property, and the value of the same, within the State, as assessed in the year 1849.

JOS. T. FALES,
Auditor of State.

Number of acres of land assessed	3,150,394
Value of land with the improvements	$10,849,624
Value of town lots and improvements	$2,945,299
Value of capital employed in merchandise	$819,637
Value of mills, manufactories, carding machines, &c.	$319,211
Number of horses over two years old	34,741
Value of do. do.	$1,272,005
Number of neat cattle over two years old	91,222
Value of do. do.	$953,518
Number of mules and asses over one year old	231
Value of do. do.	$12,609
Number of sheep over six months old	140,787
Value of do. do.	$156,168
Number of hogs over six months old	226,861
Value of do. do.	$258,189
Number of pleasure carriages	4,756
Value of do. do.	$167,200
Number of watches	1,811
Value of do.	$45,427
Number of piano-fortes	47
Value of do. do.	$6,810
Value of all other personal property over $100	$237,265
Value of stock and profits in companies	$12,293
Value of right or interest in any boat or vessel	$19,194
Value of gold or silver coin or bank notes	$213,782
Value of claim or demand for money or other consideration	$510,577
Value of annuities	$3,918
Value of money invested and secured by deed or mortgage	$108,692
Value of miscellaneous property	$46,774
Total value of all kinds of property	$18,496,151
Number of polls	29,397

STATISTICS OF OHIO.

We are indebted to M. B. Bateham, Esq., editor of the "Ohio Cultivator," for the following valuable table.

FARM STOCK IN THE STATE OF OHIO.

A Table showing the Number of Horses, Mules, Cattle, Sheep, and Hogs, in each County of the State, according to the Returns of the Assessors in 1849.

Counties.	Horses.	Mules.	Cattle.	Sheep.	Hogs.
Adams	5,955	15	8,438	22,090	29,752
Allen	3,208	......	6,410	11,906	12,566
Ashland	7,260	2	14,292	66,185	24,108
Ashtabula	5,809	81	35,202	61,920	7,809
Athens	4,666	6	11,343	46,021	19,692
Auglaize	2,857	28	6,706	8,567	11,880
Belmont	9,552	5	13,449	71,365	31,323
Brown	7,982	86	10,051	22,990	43,077
Butler	10,682	18	12,420	16,162	63,425
Carroll	5,580	24	10,115	79,758	15,589
Champaigne	7,172	174	12,753	46,870	27,093
Clark	6,765	196	14,031	55,242	25,648
Clermont	8,379	58	10,687	22,195	51,076
Clinton	6,795	221	11,485	49,491	40,588
Columbiana	8,457	7	14,970	124,287	21,234
Coshocton	7,418	8	18,694	59,377	28,253
Crawford	5,118	1	18,488	15,183	20,922
Cuyahoga	6,562	8	19,000	89,921	11,151
Darke	6,340	2	10,808	23,478	29,869
Defiance	1,165	2	3,821	2,115	6,244
Delaware	6,620	29	12,725	47,906	30,578
Erie	3,718	......	8,939	56,361	8,032
Fairfield	10,166	8	16,724	48,105	42,444
Fayette	5,888	486	14,815	42,464	34,125
Franklin	9,466	112	15,007	62,981	54,516
Gallia	4,402	20	8,293	22,623	17,960
Geauga	4,012	14	21,767	79,518	6,346
Greene	7,870	80	12,580	44,277	36,484
Guernsey	9,282	8	14,182	81,662	30,771
Hamilton	12,419	84	12,239	9,879	37,672
Hancock	4,606	4	9,493	21,509	17,532
Hardin	2,326	7	4,715	7,549	9,982
Harrison	5,969	11	9,892	123,767	19,806
Henry	510	4	1,910	1,087	2,308
Highland	9,027	24	12,024	39,337	58,286
Hocking	3,416	......	7,012	18,828	14,979
Holmes	6,185	14	12,023	51,926	20,979
Huron	6,460	13	17,378	75,951	16,540
Jackson	3,827	21	9,687	22,967	19,607
Jefferson	6,827	8	9,727	105,872	20,233
Knox	8,407	11	14,377	85,888	24,657
Lake	3,201	11	11,140	45,421	4,842
Lawrence	2,608	96	5,757	8,379	14,641
Licking	11,670	81	19,832	118,789	38,891
Logan	6,120	50	10,114	36,186	21,784
Lorain	5,661	20	20,879	91,566	12,725
Lucas	2,623	3	10,098	14,131	8,563
Madison	4,782	176	20,600	48,058	28,587
Mahoning	6,829	17	6,325	115,967	13,751
Marion	4,900	68	11,151	47,528	23,534

Counties.	Horses.	Mules.	Cattle.	Sheep.	Hogs.
Medina	6,081	2	13,292	100,659	12,188
Meigs	3,061	24	7,587	22,717	11,489
Mercer	3,289	1	4,709	5,410	11,009
Miami	7,424	4	10,799	29,024	26,890
Monroe	5,780	19	10,160	28,557	27,607
Montgomery	9,935	19	18,996	29,019	34,248
Morgan	7,853	7	12,897	55,669	26,097
Morrow	6,417	12	12,929	57,667	19,962
Muskingum	11,889	29	19,676	91,785	37,645
Ottowa	798	......	2,866	7,185	4,049
Paulding	339	......	914	421	1,954
Perry	6,411	14	11,018	49,478	20,578
Pickaway	8,181	4	23,889	31,056	54,882
Pike	3,872	6	5,760	12,865	19,911
Portage	5,806	49	26,691	126,577	11,819
Preble	7,965	8	11,167	26,614	38,744
Putnam	1,819	......	4,246	5,648	8,174
Richland	8,800	13	16,811	70,179	26,687
Ross	10,228	82	24,129	30,350	66,488
Sandusky	3,590	2	9,484	24,702	14,017
Scioto	3,809	82	6,595	11,393	17,245
Seneca	7,342	......	15,598	59,818	25,376
Shelby	4,210	45	7,541	16,641	15,241
Stark	9,976	7	19,773	97,769	29,983
Summit	5,740	6	17,169	93,776	15,316
Trumbull	7,072	72	35,968	98,975	12,560
Tuscarawas	7,994	15	15,626	74,581	25,167
Union	4,018	190	8,445	21,609	19,245
Vanwert	937	7	2,649	2,147	5,952
Warren	8,487	4	12,149	28,635	41,717
Washington	5,188	......	16,392	43,752	16,561
Wayne	10,075	9	19,035	84,172	27,875
Williams	1,164	......	5,287	4,697	6,290
Wood	2,015	1	6,584	7,638	7,845
Wyandot	3,227	6	7,649	20,732	12,917

TOTALS.

	Number.	Est. Value.
Horses	506,883	$18,162,269
Mules	2,945	101,238
Cattle	1,058,983	10,463,526
Sheep	3,911,836	2,072,287
Hogs	1,947,672	2,449,820
Total value of domestic animals		$33,269,135

Note.—The foregoing table does not include horses and cattle under two years old, mule under one and a half years old, and sheep and hogs under six months old, on the first day of June last.

COMPARATIVE STATEMENTS.

	No. in 1847.	1848.	1849.
Horses	472,392	492,509	506,833
Mules	1,205	2,098	2,945
Cattle	900,162	988,822	1,058,933
Sheep	3,365,025	3,677,171	3,911,836
Hogs	1,757,318	1,879,689	1,947,472

Increase in two Years.

Horses	34,441	or	7¼ per cent.
Mules	1,740	"	144 "
Cattle	158,771	"	17½ "
Sheep	546,811	"	10½ "
Hogs	190,354	"	10 4-5 "

It will be seen that the rate of increase of cattle is greater than of any other animals. This is owing to the rapid increase of the dairy business in the northern counties, and of the beef cattle trade in the Scioto Valley. It will be seen by the table that the greatest number of cattle are in these two districts—thus:

Dairy Counties.

Trumbull	35,968
Ashtabula	35,202
Portage	26,991
Geauga	21,767
Lorain	20,879
Cuyahoga	19,000

Beef Cattle Counties.

Ross	24,129
Pickaway	28,809
Madison	20,600
Fairfield	16,724
Franklin	15,007
Fayette	14,815

Of sheep, the rate of increase is quite rapid, and the greatest number are found in about a dozen counties in the north and east parts of the State, where the land is best adapted for this purpose—thus:

Mahoning	155,967
Portage	126,577
Columbiana	124,287
Harrison	123,767
Licking	118,789
Jefferson	105,872
Medina	100,059
Trumbull	98,975
Stark	97,769
Summit	93,776
Lorain	91,566
Cuyahoga	89,921
Muskingum	81,785
Guernsey	81,612
Carroll	79,758
Geauga	79,518

By comparison with former tables, we find that the greatest increase of sheep has taken place in Mahoning county, being no less that 58,878, or more than 50 per cent. in two years! and from the *fourth* sheep county in 1847, making it the *first* in 1849; while in cattle she has decreased in as great ratio, though not in as great number or value. Trumbull county, on the other hand, has increased her number of cattle, and decreased in sheep—owing doubtless to the extension of the dairy business in her borders. Similar changes, though not so extensive, may be observed in several other counties.

COMMERCE OF CLEVELAND IN 1849.

The statement prepared by Mr. W. G. Lawrence, deputy collector at this port, shows the commerce of Cleveland to have been as follows:

Imports	Coastwise	$5,719,890
Exports	do	5,517,514
Imports	Foreign	124,979
Exports	do	162,202
		$11,524,585

This amount does not comprise all the receipts at this port, as several merchants who receive large quantities of merchandise by steamer, which is not reported at the Custom House, have failed to report.

The total imports and exports for 1848 amounted to $13,886,513.69, which is an excess over those of the present year, of $2,361,928.59. This deficiency is readily accounted for by the shortness of the wheat crop the past season, and the difference in the value of the merchandise imported during the two seasons.

The decrease of wheat and flour exported as compared with 1848, is	$1,213,152.87
And of merchandise imported	2,454,700.00
Making a total decrease of	$3,667,852.87

in articles which depend upon the season or the activity of country business, and over which lake commercial interests can exert little control. The decrease of merchandise is in a great measure to be attributed to the late opening of the canal, which forced a large quantity of goods on the Southern routes.

The Canadian trade has nearly doubled within the past year, and we have the best assurance of a corresponding increase during the coming one. With full crops and general commercial prosperity, the business of 1850 will surpass that of any previous year; and in 1851, with the Cincinnati and Pittsburg Railroads in full operation, the eleven and a half millions of Cleveland business will be swelled to twenty millions at least.

Imports Coastwise from the Port of Cleveland for 1849.

		Quantity.	Value.
Salt	bbls.	120,577	$120,577
Do	sks.	27,800	3,483
Water lime	bbls.	4,308	6,492
Lake fish		13,387	80,322
Molasses		462	6,206
Sugar		1,378	20,670
Do	hhds.	491	29,460
Oil	cks.	178	10,020
Turpentine	bbls.	60	1,080
Cranberries		90	540

		Quantity.	Value.
Tar	bbls.	200	$800
Leather	sides,	5,109	15,684
Do	rls.	454	18,920
Crockery	crates,	67	2,680
Stoves and furniture		1,181	14,172
Bar iron	tns.	626	48,820
Scrap do		220	4,400
Pig do		208	5,824
Railroad do		100	5,000
Copper (masses)		1,000	300,000
Castings		265	6,540
Coal (Lehigh)		515	2,848
Plaster		712	86,120
Marble		1,092	22,550
Foreign liquors	pipes,	64	92,166
Glass	bxs.	596	1,490
Nails	kegs,	1,476	6,642
Burr blocks		1,722	2,158
Oakum	bls.	180	680
Powder	kgs.	465	2,098
Pails	doz.	842	684
Limestone	cds.	609	8,654
Potatoes	bush.	550	272
Axes	bxs.	86	432
Coffee	sks.	845	11,592
Tea	chts.	374	14,960
Lumber	M.ft.	6,808	642,729
Shingles	M.	1,722	3,444
Lath		172	301

Statement of some of the principal Articles that arrived at, and cleared from Cleveland, by way of Canal, during the years 1848 *and* 1849.

Arrived.		1848.	1849.
Barrels	Flour	417,524	876,112
do	Pork	26,111	28,081
do	Whisky	41,185	36,238
do	Linseed oil	1,157	808
Pounds	Pot and pearl ashes	64,884	194,441
do	Pig Iron	7,077,964	6,344,395
do	Butter	2,554,894	2,041,854
do	Bacon	1,820,155	1,145,583
do	Lard	1,636,803	1,728,866
do	Tallow	206,828	263,266
do	Iron and nails	15,674,789	10,434,591
do	Wool	1,407,261	2,008,987
Bushels	Mineral coal	1,925,451	1,910,474
do	Corn	621,454	547,605
do	Oats	165,955	13,107
do	Wheat	1,585,270	851,123

Cleared.		1848.	1849.
Barrels	Salt	72,400	74,742
do.	Lake fish	9,782	18,225
Pounds	Merchandise	13,882,416	18,471,180
do.	Castings	1,096,026	958,817
do.	Machinery	172,760	55,226
do.	Ohio saleratus	471,758	346,645
do.	Pot and pearl ashes	268,537	255,342
do.	Hides and skins	128,886	226,338
Feet	Lumber	4,906,920	7,111,579
Shingles		4,556,250	4,662,256
Hoops		1,840,826	1,244,170

(Cleveland Herald.)

OHIO—HER WEALTH AND RESOURCES.

The "Appendix" to the Report of the Auditor of State furnishes the following official information:—

Acres of land	23,768,835
Value of lands	$264,661,957
Value of towns	71,177,354
Value of personal property, moneys, and credits	92,235,476
Total value of taxable property	430,839,885
State tax on property	1,296,547
County, school, and township taxes	1,462,721
Road tax	282,152
School houses and other special taxes	495,436
Total taxes on grand list of 1849	$3,631,878
Number of horses	506,833
Value	$18,162,269
Number of mules	2,945
Value	$101,238
Number of cattle	2,058,983
Value	$10,483,526
Number of sheep	3,911,836
Value	$2,072,287
Number of hogs	1,947,672
Value	$2,449,820
Total value of domestic animals	$33,269,135
Number of pleasure carriages	56,805
Value	$2,523,400
Number of watches	68,516
Value	$850,428
Number of pianos	2,117
Value	$275,203
Value of unenumerated articles	$4,412,163
Merchants' stock	15,407,347
Moneys and credits	31,149,145
Total amount of personal property	92,235,476

Railroad Stocks held by the State.

Mad River and Lake Erie	$298,050
Mansfield and Sandusky	28,888
Little Miami	121,900
Stock dividends on above	71,800
Total amount held by the State	$520,188

Canal Stocks held by the State.

Cincinnati and White Water Canal	$150,000
Pennsylvania and Ohio	420,000
Total	$570,000

The total amount of turnpike, railroad, and canal stocks held by the State is $3,011,858. Dividends on turnpike and canal stock last year, $88,049.

The total amount of capital bank stock, paid in, in all the banks, is $6,488,817, and the amount of tax paid by them to the State, the past year, was $56,862 58.

IRON MANUFACTURES OF CINCINNATI.

The Cincinnati *Chronicle* gives a most gratifying statement of the progress of the Iron manufacturing interest in that city. It says:

The importance of this branch of business is probably equal to, if not greater than, that of any one business in the city. If all the population dependent upon, and incidental to, the manufacture of iron here, in all its several branches, small and great, were collected separately, in one place, it would constitute a town nearly equal to the city of Lowell. This may seem incredible to those who are constantly pointing to cotton manufacturing towns of New England as samples of rapid growth; but, in this city, manufactures are mixed up with the general business of the city, so that it is not until the statistics of some one branch are accurately gathered, that we can see and understand its influence on the city.

As regards the iron works proper, excluding blacksmiths, etc., and including the rolling mills of Covington and Newport, as substantially those of Cincinnati, the following results are reached:—

Number		6
Hands employed		765
Capital invested		$700,000
Products of manufacture		1,230,000
Pig iron consumed	tns.	15,000
Blooms do		5,600
Scrap do		200
Coal consumed	bush.	925,000

Of foundries, engine and machine shops, etc., there are:

Number		26
Hands employed		1,805
Capital invested		$1,448,000
Products of manufactures		2,439,000
Pig iron consumed	tns.	14,840
Blooms do		150
Scrap do		605
Coal consumed	bush.	541,500
Coke do		77,500

In the stove business alone, the manufacture has, within a few years past, risen to half a million of dollars. The summary of iron stove works, in whole or greater part, is:

Number		16
Hands employed		936
Capital invested		$617,000
Product of manufactures		917,000
Pig iron consumed	tns.	10,700
Blooms		
Scrap iron		625
Coal consumed	bush.	65,900
Coke do		117,000

From the above tables the following aggregates are drawn:

Rolling mills, foundries, machine shops, and stove factories	No.	48
Hands employed		3,500
Capital invested		$2,765,000
Products of manufactures		4,686,090
Pig iron consumed	tns.	40,940
Blooms do		5,756
Scrap iron do		2,080
Coal do	bush.	1,582,400
Coke do		194,500

It will be seen by this last table that all these establishments employ a little more than 3500 hands. It is reasonable to suppose that five persons are directly dependent on each of these, and this constitutes, with ample abatement, a population of 16,000 persons connected with the iron works of Cincinnati alone. If to these be added the number of those *indirectly* engaged by these works, it is fair to run up the estimate to 25,000 persons.

The *Chronicle* asserts that this manufacture has increased in a more rapid ratio than the population, and gives the following table, made up from proper statistics, to prove it:

	Increase of people.	Increase of iron works.
From 1836 to '41—increase	325 ℘ cent.	400 ℘ cent.
From 1841 to '49—increase	112 ℘ cent.	450 ℘ cent.

The iron business of Cincinnati is estimated, at the present time, to be worth five millions of dollars ℘ annum.

COMMERCE OF ST. LOUIS.

Estimated Value of thirty-one of the leading Articles of Produce received at the Port of St. Louis, for the years 1848 and 1849, commencing on the 1st of January and ending on the 31st of December, with Total Valuation.

Articles.	1849. Agg. Amount.	1849. Average Rate.	1849. Estimated Value.	1848. Agg. Amount.	1848. Av'ge Rate.	1848. Estimated Value.	Total Valuation.
Tobacco leaf ... hhds.	2,879	140 00 ... ℔ hhd.	$403,060 00	2,946	145 00	$405,666 00	$808,620 00
Do. manufactured ... bxs.	5,904	15 00 ... ℔ box.	88,560 00	5,446	13 20	71,867 07	160,427 07
Hemp ... tons.	9,258	110 00 ... ℔ ton.	1,018,380 00	9,454	85 00	803,590 00	1,820,970 00
Lead ... tons.	16,428	85 40 ... ℔ ton.	1,402,951 20	24,380	74 00	1,790,300 00	3,193,751 20
Flour ... bbls.	306,412	4 20 ... ℔ bbl.	1,286,930 40	367,534	4 25	1,057,258 00	2,344,188 40
Wheat ... bush.	1,792,526	80 ... ℔ bush.	1,434,020 80	2,194,780	70	1,536,346 00	2,970,370 00
Corn ... bush.	306,325	31 ... ℔ bush.	94,053 25	600,600	23	138,214 06	232,267 27
Oats ... bush.	262,201	25 ... ℔ bush.	70,061 50	243,760	21	51,177 00	121,318 50
Barley ... bush.	92,405	70 ... ℔ bush.	64,724 10	111,006	38	42,181 14	106,905 24
Rye ... bush.	5,544	40 ... ℔ bush.	2,257 60	9,075	35	3,176 25	5,433 85
Beans ... bush.	9,078	40 ... ℔ bush.	2,731 20	14,190	40	5,676 40	8,408 60
Beef ... tierces.	10,687	9 00 ... ℔ tierce.	96,183 00	9,260	8 50	78,636 50	175,819 50
Do ... bbls.	12,226	8 00 ... ℔ bbl.	98,088 00	7,963	6 50	51,411 75	150,099 75
Pork ... bbls.	112,962	8 00 ... ℔ bbl.	920,886 00	96,613	7 50	724,695 00	1,645,581 00
Do. bulk ... lbs.	9,661,066	2½ ... ℔ lb.	241,301 65	8,464,000	2½	211,380 00	452,681 40
Lard ... tierces.	15,901	17 50 ... ℔ tierce.	276,517 50	6,579	17 50	112,122 50	388,640 00
Do ... bbls.	58,270	13 00 ... ℔ bbl.	757,510 00	67,230	13 50	909,941 50	1,668,451 50
Do ... kegs.	15,845	3 50 ... ℔ keg.	64,957 50	14,180	3 50	49,630 00	114,587 50
Bacon ... casks.	16,380	30 00 ... ℔ cask.	500,400 00	25,580	28 00	722,980 00	1,223,380 00
Do ... bbls. & bxs.	3,246	12 50 ... ℔ box & bbl.	40,562 50	3,775	14 00	52,865 00	93,428 50
Pickled Hams and Shoulders ... casks.	10,564	14 56 ... ℔ cask.	158,178 00	7,480	14 00	104,808 00	263,036 00
Whisky ... bbls.	29,066	7 50 ... ℔ bbl.	217,997 50	30,759	6 50	201,454 40	419,452 00
Tallow ... lbs.	721,460	6¼ ... ℔ lb.	45,088 55	485,920	6½	31,454 00	76,543 35
Butter ... lbs.	1,256,280	8½ ... ℔ lb.	106,938 80	1,106,240	9	99,561 00	206,500 40
Bale Rope ... coils.	19,066	7 25 ... ℔ coil.	142,211 25	12,683	7 25	91,460 25	233,600 50
Bagging ... pieces.	1,079	14 00 ... ℔ piece.	15,106 00	1,034	14 00	15,170 00	30,286 00
Potatoes ... bush.	106,600	30 ... ℔ bush.	31,980 00	157,057	30	47,300 10	79,280 10
Onions ... bush.	21,260	50 ... ℔ bush.	10,675 00	22,451	35	7,858 35	18,533 35
Grease ... lbs.	351,361	3½ ... ℔ lb.	12,314 75	201,260	3½	7,046 25	19,361 00
Hides, dry and green ...	66,908	1 90 ... each.	126,025 00	65,097	1 00	66,306 00	192,331 00
Hay ... tons.	920	16 00 ... ℔ ton.	14,720 00	845	12 00	10,144 00	24,864 00
Flaxseed ... bush.	26,500	85 ... ℔ bush.	22,525 00	22,400	80	26,908 00	49,433 00
Feathers ... lbs.	62,840	28 ... ℔ lb.	17,455 20	31,380	28	10,272 00	27,727 20
Brooms ... doz.	11,022	1 60 ... ℔ doz.	17,636 50	6,712	1 25	8,391 25	26,028 00
Dried Fruit ... bush.	68,108	80 ... ℔ bush.	54,781 50	47,686	86	40,464 25	95,245 05
Green Apples ... bbls.	20,585	1 50 ... ℔ bbl.	30,274 50	12,683	1 50	18,722 00	49,006 50
Wool ... bales.	1,274	22 50 ... ℔ bale.	28,665 00	904	22 50	20,340 00	49,005 00
Total estimated value ...			$10,067,287 90			$10,268,415 [illegible]	$20,335,703 [illegible]

Difference in favor of the year 1848, $201,127 84.

[St. Louis Republican.]

STATISTICS OF KENTUCKY, FOR 1849 AND 1848.

TAXABLE PROPERTY.	VALUATION. 1849.	VALUATION. 1848.	INCREASE.
	Dollars.	*Dollars.*	*Dollars.*
20,067,852 acres of land......	135,142,565		
19,425,063 do. do..........	....	127,631,871	7,510,694
31,888 town lots..............	30,150,406		
29,215 do..................	....	29,140,378	1,010,028
2,673 increase in town lots.			
195,110 total slaves...........	62,261,571		
192,470 total slaves...........	....	60,820,378	1,441,193
2,640 increase of slaves.			
344,478 horses and mares	11,609,095		
353,249 do. do.........	....	11,297,606	311,489
8,771 decrease in horses and mares.			
44,369 mules	1,557,198		
41,081 do.	....	1,533,740	23,458
3,288 increase in mules.			
2,409 jennies	123,626		
2,325 do.	....	114,680	8,946
84 increase in jennies.			
511,894 neat cattle	2,379,117		
495,538 do. do.	....	2,030,621	348,496
16,356 increase in cattle.			
3,474 stores	8,115,787		
3,320 do.	....	7,916,670	199,117
154 increase of stores.			
Value under Equalization Law	33,746,013		
Value under Equalization Law	....	32,361,752	1,384,261
Total......................	285,085,378	272,847,696	12,237,682
Total amount of taxes........	561,882	423,163	138,291

Swine and sheep appear to be exempt from tax in Kentucky. The above figures show an increase of cattle of 16,850 head, and a decrease of horses of 8,771. The latter is quite remarkable. The increase in mules is 3288; and the business of growing this kind of stock is doubtless profitable.

A slight modification of the schedules used in collecting the statistics now obtained, would suffice to learn the acres planted in corn, wheat, hemp, and tobacco, and the yield per acre. Kentucky is admirably adapted, by soil and climate, to sheep husbandry; and if the number annually shorn and the weight of fleeces were given, the knowledge so obtained would aid much in directing public attention to this branch of rural industry. Nor should statistics relating to the dairy be entirely neglected in a commonwealth which possesses so great agricultural capabilities. The owners of the fertile lands of Kentucky and Tennessee do injustice to themselves, in not letting the world know more of the intrinsic productive value of these lands. They abound in the most precious elements of bread and meat, to a vast and unknown depth.

FOREIGN PORTS.

GREAT BRITAIN.

STATISTICS OF COTTON FOR 1848 AND 1849.

Import of Cotton Wool.

From—	Liverpool. 1849.	Liverpool. 1848.	London. 1849.	London. 1848.	Bristol & Hull. 1849.	Bristol & Hull. 1848.	Scotland. 1849.	Scotland. 1848.	Total Import. 1849.	Total Import. 1848.
United States	1,383,027	1,297,985	3,800	2,100	14,990	9,000	76,000	66,800	1,477,727	1,375,885
Brazil & Portugal	163,768	100,201	......	......	......	......	......	......	163,768	100,201
Mediterranean	71,251	27,810	......	1,200	......	......	1,400	......	72,651	29,010
East Indies	106,967	136,012	46,700	64,700	15,400	6,400	13,100	20,400	182,167	227,512
Demerara, W. I. &c.	7,714	6,089	900	1,500	......	......	500	800	9,114	7,389
Total........pkgs.	1,732,727	1,568,097	51,400	69,500	30,300	15,400	91,000	87,000	1,905,427	1,739,997

Comparison of the Stocks at the Close of the Years 1849 and 1848.

	1849.	1848.
Liverpool	468,100	393,300
London	39,800	57,800
Bristol and Hull	7,000	2,500
Glasgow	44,500	45,000
Total in ports	559,400	498,600
Dealers and spinners	100,000	100,000
Total unconsumed	659,400	598,600

Total unconsumed, 1st January, 1850, 240,325,000 lbs. Average about 364 lbs. ℔ bag.

Total unconsumed, 1st January, 1849, 220,198,000 lbs. Average about 368 lbs. ℔ bag.

Import, Export, and Consumption, for the Year 1849.

Stock in the ports, 1st January, 1849		498,600
Stock in dealers' and spinners' hands—		
In England	93,000	
In Scotland	7,000	100,000
Import in 1849		1,905,400
Total		2,504,000

Export to the Continent and Ireland. 152,300 American, 16,800 Brazil and West India, 84,600 East India, 500 Egyptian............	254,200
Taken for consumption of England and Scotland, from the ports............	1,590,400

Consumed in England, 1,494,100, or 28,694 bags ℔ week.
Consumed in Scotland, 96,300, or 1852 bags ℔ week.

Remaining on hand in the ports, 1st Jan., 1850............	559,400
In dealers' and spinners' hands...England.......90,000 In dealers' and spinners' hands...Scotland.......10,000	100,000
Total............	2,504,000

Import.—The Table of Import into Great Britain, compared with the preceding year, shows an increase of 102,400 American, 68,600 Brazil, 43,600 Egyptian, 1200 West India, and a decrease of 45,300 East India; making a total increase of 165,500 bags.

Consumption.—The average consumption of Great Britain we estimate at 30,546 bags, consisting of 5644 Upland, 18,467 New Orleans and Alabama, and 577 Sea Island—total American, 24,688 bags, 2260 Brazil, 969 Egyptian, &c., 2442 East India, and 187 West India, being an increase upon the consumption of last year of 2400 bags ℔ week; but in packages, at the average consumption of that year, of 2603 bags, or for the whole year, fifty-three millions and a quarter pounds weight.

Stock.—The stock in the kingdom, as compared with the last year, shows an increase of 41,600 American, 29,500 Brazil, 21,700 Egyptian, and a decrease of 31,400 East India, and 600 West India—making a total increase of 60,800 bags. The discrepancy occurring this year between the weekly estimate of stock and the ascertained amount as made up to-day, has probably arisen from a change in the mode of collecting. Previously, it was done by personal application, every Friday morning; lately the return has been made upon a printed form. The most earnest efforts will certainly be made to prevent a recurrence of such a vexatious error.

Weight.—The average weight of the import we calculate at 380 lbs. ℔ bag for Upland, 452 New Orleans and Alabama, 330 Sea Island, 180 Brazil, 210 Egyptian, 376 East India, and 210 West India, &c.—making the total import in ℔. weight 754,802,000, being an increase upon the last year of 67,811,000 ℔. weight.

GEORGE HOLT & Co., *Cotton Brokers.*

LIVERPOOL, *Dec.* 31, 1849.

LEAF TOBACCO.

Estimated Stocks in Europe on the 31st December, for last Five Years.

	1845.	1846.	1847.	1848.	1849.
London............hhds.	27,518	38,274	29,578	28,031	26,547
Liverpool............hhds.	16,900	20,500	18,400	16,119	16,356
Bristol, Newcastle, &c......hhds.	1,700	2,000	2,090	2,301	2,645
Scotland............hhds.	1,800	1,700	2,590	1,740	1,980
Ireland............hhds.	1,800	1,609	1,880	1,600	1,600
North of Europe............hhds.	200	200	200	200	200
Bremen and Hamburg......hhds.	13,600	17,500	12,400	14,500	10,000
Amsterdam, Antwerp, and Rotterdam............hhds.	26,000	21,700	20,700	15,500	10,800
Spain and Portugal.........hhds.	2,000	2,000	900	200	200
France............hhds.	200	200	200	200	200
Total............	91,213	100,774	88,858	80,391	70,535

Statement of Receipts at New Orleans, from 1840 to 1849.

	Hogsheads.		Hogsheads.
1840............	43,253	1845............	[illegible]493
1841............	58,147	1846............	72,896
1842............	67,555	1847............	55,588
1843............	92,509	1848............	55,882
1844............	82,485	1849............	52,335

TRADE OF CUBA.

The following is a comparative statement of the Exports of Sugar from Havana and Matanzas for the last two years; also the Exports of Molasses from Havana, Matanzas, and Cardenas, during the same time:—

SUGAR.

Countries.	From Havana. 1849.	1848.	From Matanzas. 1849.	1848.
Great Britain............boxes	90,479	102,823	47,286	49,878
Cowes, and market............	158,610	108,978	37,686	81,491
Russia............	26,562	15,184	30,496	9,630
Sweden and Denmark............	7,058	4,475	2,871	1,980
Hamburg............	96,238	52,170	8,904	18,714
Bremen............	6,000	10,037	1,897	4,130
Holland............	14,945	10,733	637	
Belgium............	49,630	46,055	6,494	7,410
Havre and Bordeaux............	5,801	15,686	4,559	2,059
Marseilles............	23,499	21,263	6,250	1,147
Spain............	107,188	126,840	22,148	24,922
Trieste and Italy............	16,644	21,774	15,316	18,021
Boston............	8,647	14,497	8,826	22,579
New York............	32,004	73,905	30,783	47,850
Philadelphia............	8,894	22,161	6,203	12,170
Baltimore............	2,041	2,414	8,454	2,610
New Orleans............	9,417	19,134		
Other U. S. ports............	1,662	997	4,998	8,821
British Provinces............	152	716	2,242	724
Various............	7,254	15,639	561	2,026
Total............	602,220	684,981	241,106	310,662

MOLASSES.

Destination.	From Havana.		From Matanzas.		From Cardenas.	
	1848.	1849.	1848.	1849.	1848.	1849.
Boston ....hhds.	8,057	11,482	10,019	8,656	26,281	21,904
Other Eastern ports..	7,459	9,726	21,543	17,816	18,690	14,299
N. Y., Phila., & Balt.	5,285	5,483	12,005	13,718	24,536	22,888
Southern ports U. S.	4,435	6,892	3,536	3,888	2,180	2,452
British Provinces.....	1,081	2,033	3,700	5,156	863	924
Great Britain	....	1,371	2,143	9,640	1,483	3,267
Other places..........	643	199	265	288	....	28
Total..................	26,960	36,692	53,210	58,597	73,983	65,757

EXPORTS FROM CALCUTTA.

We extract from the Boston Atlas the following statement of the Exports from Calcutta to the United States, from the 1st of May to the 30th of November, during the past two years:—

		1849.	1848.
Indigo..................	maunds......	1,141.........	180
Hides.....................	No.......	142,762.........	247,406
Gunny cloth	pieces......	114,239.........	21,300
Gunny bags	No.......	3,230,400.........	2,354,675
Lac dye..................	maunds......	7,183.........	2,743
Linseed..................	maunds......	135,218.........	106,051
Saltpetre	maunds......	135,344.........	94,441
Shellac..................	maunds......	2,098.........	4,549
Ginger..................	maunds......	19,326.........	13,595
Silk goods	pieces......	3,124.........	4,652
Goat skins................	No.......	945,737.........	788,699
Jute....................	bales......	4,068.........	2,800
Safflower..................	maunds......	73.........	237

LIST OF CONTRIBUTORS.

We would express sincere thanks to the gentlemen named below, who have gratuitously furnished essays, reports of the crops, and other valuable information, from which most of the foregoing document has been compiled.

William A. Armstrong, Williamsport, Pa.
Myron Adams, East Bloomfield, N. Y.
John Arbuthnot, Gibson Co., Ind.
L. C. Allen, Springfield, Mass.
Charles Alford, Woodsfield, Ohio.
Morrell Allen, Pembroke, Mass.
Giles B. Avery, New Lebanon, Mass.
R. F. W. Allston, Georgetown, S. C.
Thomas Affleck, Washington, Miss.

George Blight, Germantown, Pa.
C. R. Boyer, Williamsport, Ind.
Isaac Backus, Canterbury, Vt.
J. N. Brown, Manchac, La.
M. Barnett, Benton, Ky.
Dr. J. M. Bigelow, Lancaster, Ohio.
Aaron Bagg, West Springfield, Mass.
Israel Brown, Montgomery, Ohio.
Samuel Berman, New Harrisburg, Ohio.
Alfred Brunson, Prairie du Chien, Wis.
T. Beaunat, Lavaca, Texas.
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O. B. Blackmar, Moscow, Hillsdale Co., Mich.
Hon. Elijah Barrett, Greene, Ken. Co., Me.
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Benjamin Benson, East Townsend, Ohio.
Dr. Samuel Bond, Memphis, Tenn.
Jno. F. Beard, Danbury, Conn.
E. Brown, Leesburg, Ohio.
H. K. Burgwyn, Jackson, N. C.
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L. Cadwell, La Fayette, Indiana.
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E. Clarke, Eaton, Ohio.
Samuel Cooper, Washington, D. C.
Wm. Carr, Doylestown, Pa.
Temple Cutler, Hamilton, Mass.
William Champer, New Harrisburg, Ohio.
Rufus Coats, Lima, Ohio.
J. W. Calvert, St. Francis Co., Ark.
H. Collins, New Albany, Indiana.
C. S. Chase, Racine, Wis.
Cornelius Chase. (Address omitted.)
John G. Clarke, South Kingston, R. I.
T. S. Cunningham, Portsmouth, Va.
Joel Churchill, Albion, Ill.
D. R. Coulter, Lisbon, Ark.
F. C. Clopper, Montgomery Co., Md.
J. W. Colburn, Springfield, Vt.
Linus Cone, Troy, Mich.
J. G. Chadsey, North Kingston, R. I.
Nathan Cushing, Woodstock, Vt.
Bradley G. Child, Bath, N. H.
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Thomas R. Devereux, Raleigh, N. C.
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Eli R. Dix, Vernon, N. Y.
John Davidson, Statesville, N. C.
Nathan Dustin, Galena, Ohio.
Stephen Dale, Flint Creek, Miss.
J. Delafield, Geneva, N. Y.
George W. Drisko, Jonesboro, Me.
Erastus W. Drury, Fond du Lac, Wis.
Dr. John Dascey, New York.
John H. Dent, Barbour Co., Ala.
Loring Dean, Manchester, Vt.
Wm. C. Dickson, Milledgeville, Georgia.

Dr. G. Emerson, Philadelphia.
Joseph Edwards, Lima, Pa.
Geo. W. Endicott, Bloomingdale Asylum, N. Y.

A. Fahnestock, Syracuse, N. Y.
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B. V. French, Braintree, Mass.
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William Holmes, New Harrisburg, Ohio.
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Dr. F. W. Hatch, Southport, Miss.
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Charles M. Halsted, Newton, N. J.
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Rev. B. F. Hoyt, St. Paul's, Minnesota.
Edward C. Herrick, New Haven, Conn.
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Joshua Harris, Cabanis Co., N. C.

Charles F. Ingalls, Lee Centre, Ill.

Henry B. Jones, Brownsburgh, Va.

C. M. Jackson, Montgomery, Ala.
Maj. John Jones, Chesapeake City, Del.
Philander Judson, Kossuth, Wis.

Wm. S. Keaghey, Jasper Co., Texas.
Edward Kohler, Lehigh Co., Pa.
John Kuhn, Ashland Co., Ohio.

M. Larkin, East Brandywine, Pa.
Pryor Lea, Goliad, Texas.
Wm. Lapham, Mt. Tabor, Ohio.
Charles Lee, Penn Yan, N. Y.
Dr. A. V. Lesley, New Castle, Del.
Samuel Linn, Jr., Highland Co., Ohio.

Samuel McFarland, Washington, Pa.
Dr. Moses F. Morrison, Bath, N. H.
David Myers, Wiley Bright, Miss.
Wm. P. Morgan, Kempsville, Va.
Richard G. Morriss, Morrissania, Va.
G. H. McKenney, Lincoln Co., Ky.
Wm. G. McDowell, Avoca, Ill.
R. A. Merriam, Topsfield, Mass.
B. S. Miner, Cambridge, Vt.
Daniel Meek, Knox Co., Tenn.
W. S. Morton, Farmville, Va.
J. McComb, Jeromeville, Ohio.
Samuel D. Martin, Colbyville, Ky.
Joseph H. Merreck, Franklin, N. Y.
D. D. Marsh, Croydon, N. H.
J. M. Merreck, Wilbraham, Mass.
E. T. Morrill, Atkinson, Maine.
John Miller, Lima, Pa.

Robert Neale, Mount Carmel, Ohio.
Joseph M. Nesbit, Lewisburg, Pa.

Douglas Oliver, Grant Co., Wis.
Simeon Oliver, Hernando, Miss.
Thomas Oakley, Oakland Inst., Jackson, Miss.

John S. Pettibone, Manchester, Vt.
William Painter, Concordville, Pa.
Lieut. Wm. D. Porter, U. S. Navy.
John Potter, New Harrisburg, Ohio.
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John N. Rottiers, Orleans, N. Y.
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John C. Reid, Laporte, Ind.
John Reynolds, Meadville, Pa.
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Horace Sabin, Pomfret, Conn.
G. W. Samuel, Savannah, Mo.
R. Stokes, Farmington, Ky.
Lemuel Sawyer, Washington, D. C.
Seth Severance, Butterfly, N. Y.
S. H. Starks, Benton, Ky.
J. W. Scott, Adrian, Mich.
N. D. Smith, Washington, Ark.
Joshua Swain, Cape May, N. J.
Lyman D. Stickney. (No address given.)
L. Smith, Liberty, Sullivan Co., N. Y.
Jonathan Shearer, Plymouth, Mich.
C. Springer, Meadow Farm, Ohio.
Junius Smith, Greenville, S. C.
Dr. H. P. Sartwell, Penn Yan, N. Y.
J. R. Stafford, Cleveland, Ohio.
O. B. Stewart, Montgomery, Texas.

Stewart Turbett, Port Royal, Pa.
David Taylor, Paraclifta, Ark.
J. Tagno, Wilmington, N. C.
J. J. Thomas, Macedon, Wayne Co. N. Y.
Ariel Thurston, Hydepark, Vt.

Dr. R. T. Underhill, New York.

William B. Villard, Sr., Aiken, S. C.
Dr. D. C. Van Slyck, Alloway, N. Y.
Dr. David L. White, Quincy, Fla.
James Williams, Bolivar, Ala.
William Weaver, Buffalo Forge, Va.
W. S. Wright, Granville, Ohio.
Paul A. Way, Sewickly, Pa.
Marshall P. Wilder, Boston, Mass.
Samuel Wells, Northampton, Mass.
Ralph Ware, Granville, Ill.
Sidney Weller, Brinkleyville, N. C.
Col. Josiah Wm. Ware, Berryville, Va.
J. M. Warder, Springfield, Ohio.
L. Wetherell, Rochester, N. Y.
W. A. Whitehead, Newark, N. J.

Charles Yancey, Buckingham Co., Va.
Lawrence Young, Louisville, Ky.
Andrew Young, Logansport, Ind.
James Young, Bagdad, Tenn.

C. Zeringue, Jefferson Parish, La.

NOTE.—Several valuable communications intended for this Report have been unavoidably excluded, from the necessity of keeping the volume within moderate limits. Among these are essays and reports from the following gentlemen:—Sidney Weller, N. C.; J. Tagno, N. C.; C. Springer, Ohio; Dr. J. M. Bigelow, Ohio; Lieut. W. D. Porter, U. S. N.

Respectfully submitted,

THOMAS EWBANK.

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PHILADELPHIA.

[illegible] E. Humphreys — P. S. Duval's Steam Lith. Press

LEICESTER SHEEP.

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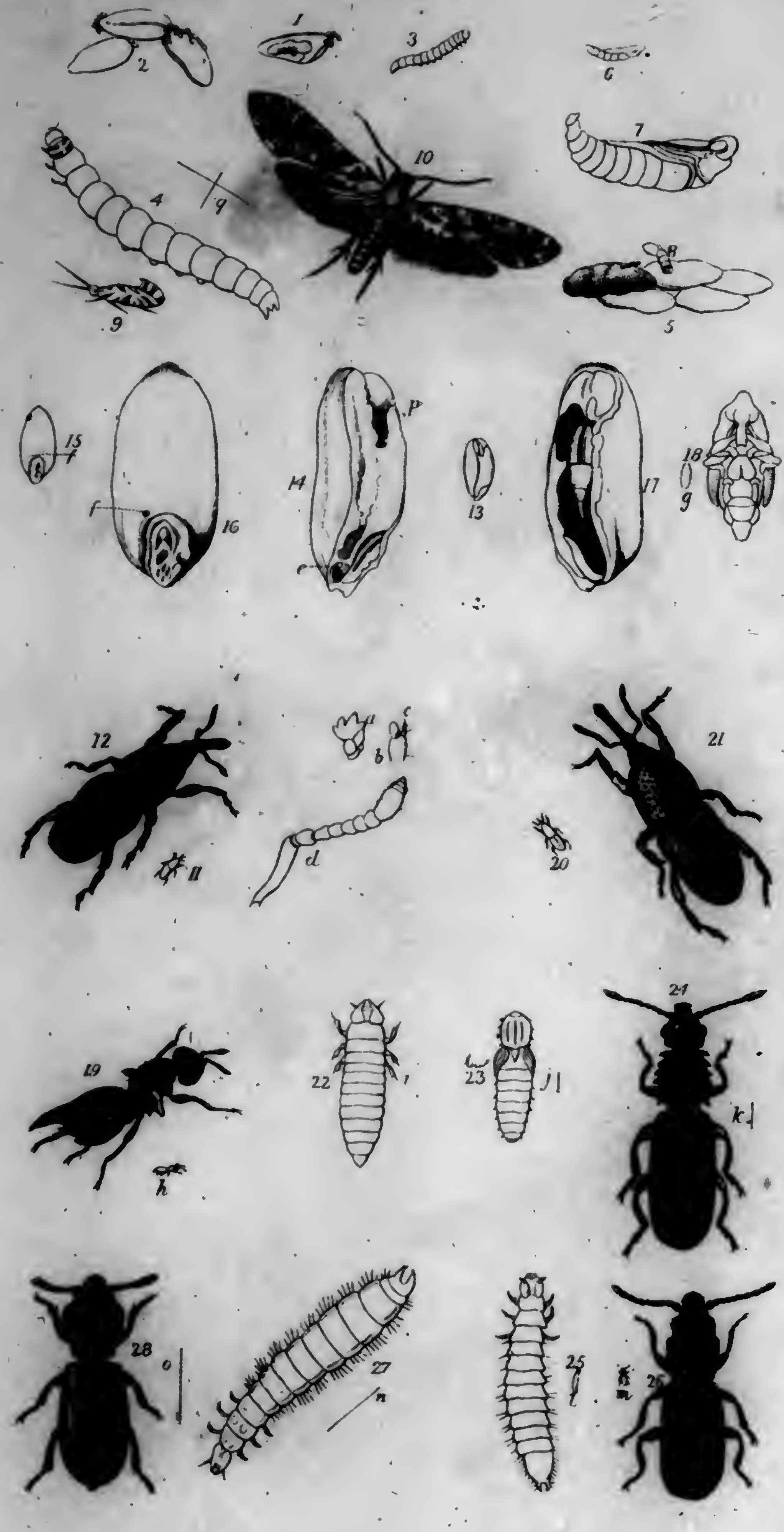
Plate. 2.



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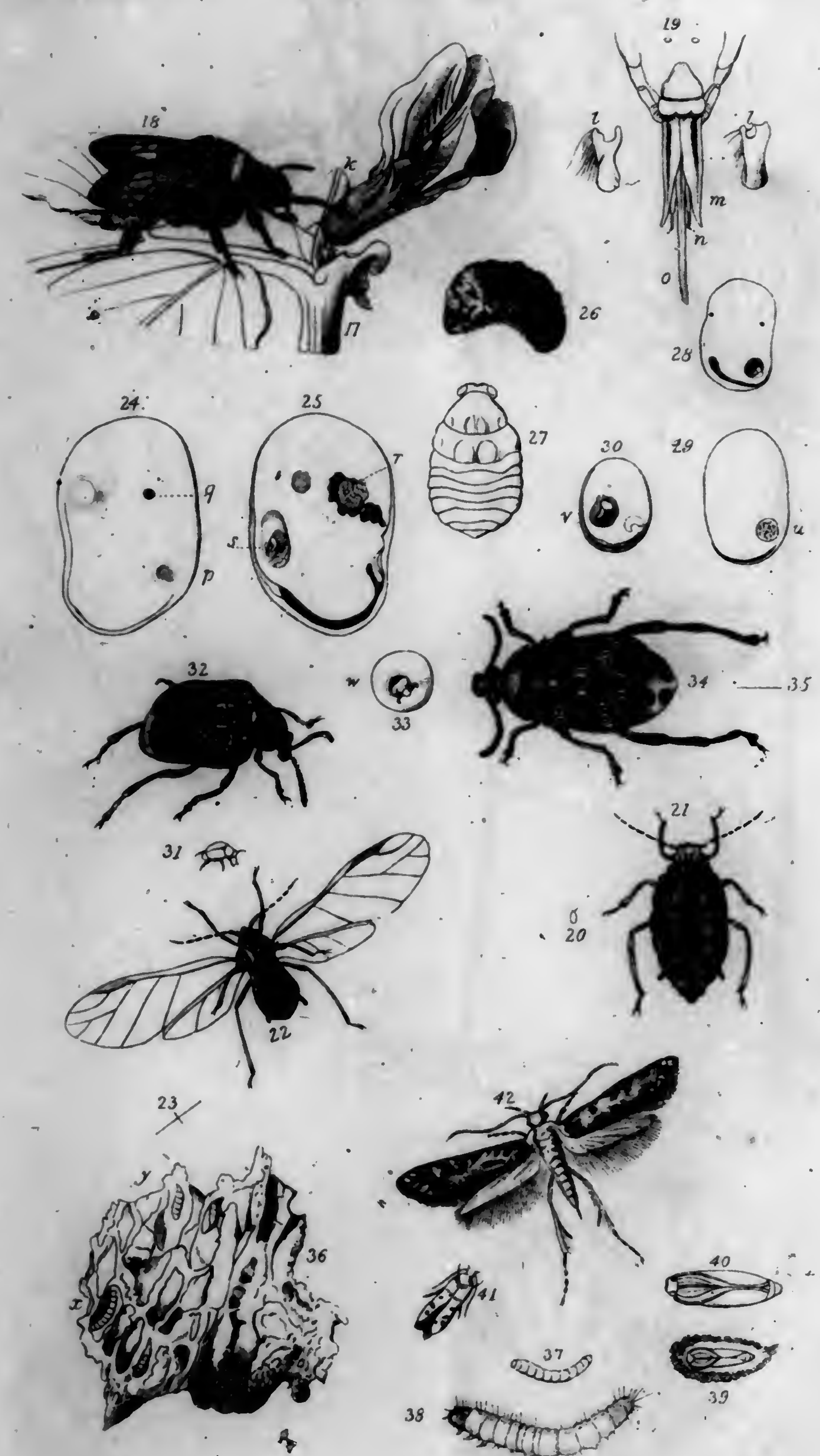
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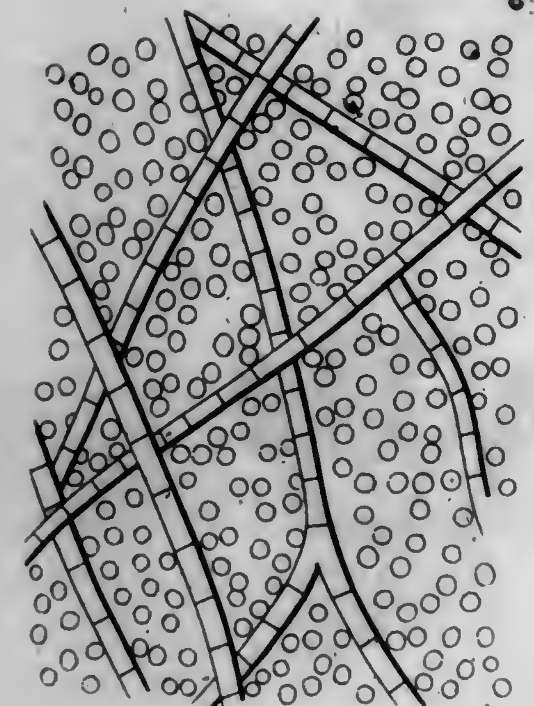

Fig 16. Sporothricum

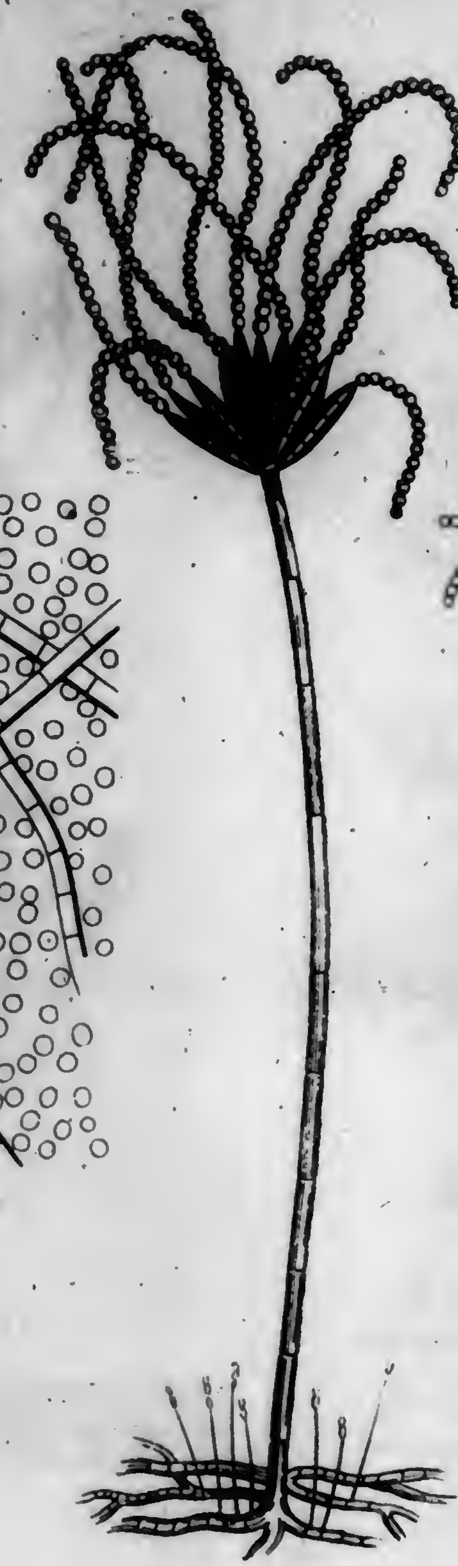

Fig 18. Penicillium

Fig 19. Aspergill.

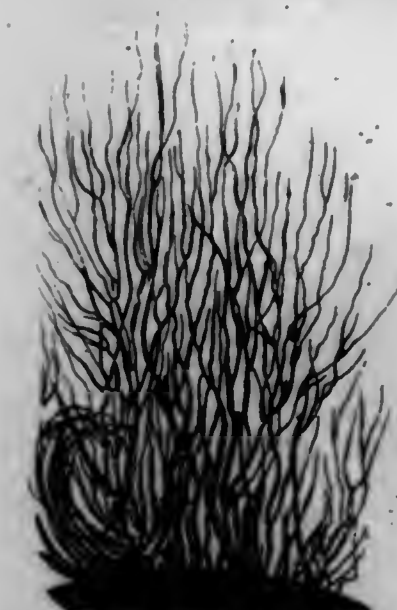

Fig 17. Threads from a Polyporus.

Fig 20. Penicillium on Milk

Senate Ex. doc. No. Report

Plate 5

Fig. 1. The jointed Threads of Common Mouldiness

Fig. 2. Threads bearing Spores.

Fig. 3. Showing the attachment of the Spores in fours.

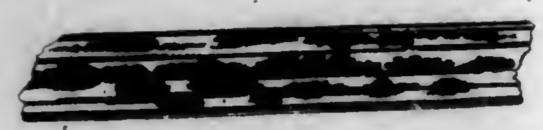

Fig. 4. Common appearance of Mildew

Fig. 5. Puccinia graminis, or Mildew magnified.

P. S. Duval's Steam lith. press

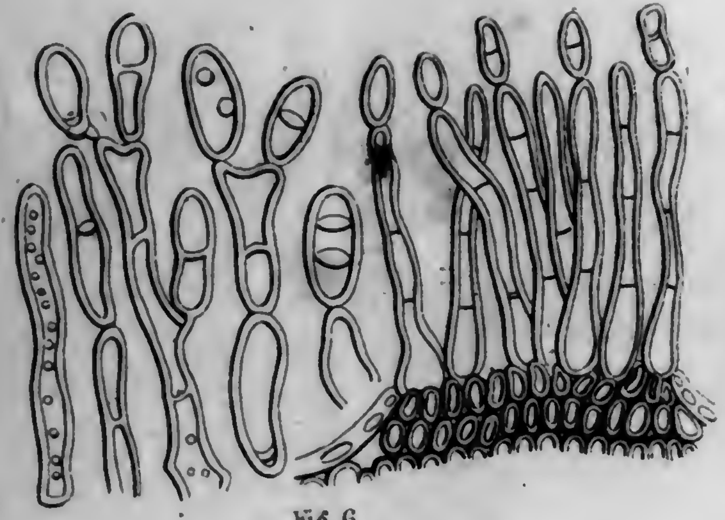

Fig. 6.

Cladosporium Herbarum magnified highly.

Fig. 7.

Common appearance of Cladosporium on Straw Slightly Magnified

Fig. 9.

Uredo Fetida.

Fig. 8.

Uredo Rubigo.

Fig. 10.

Œcidium of the Berberry.

a Represents the stem covered with black spores
b Shows a portion Magnified
c Shows the spores under a high power of the Microscope.

Fig. 11. Ustilago Hypodytes

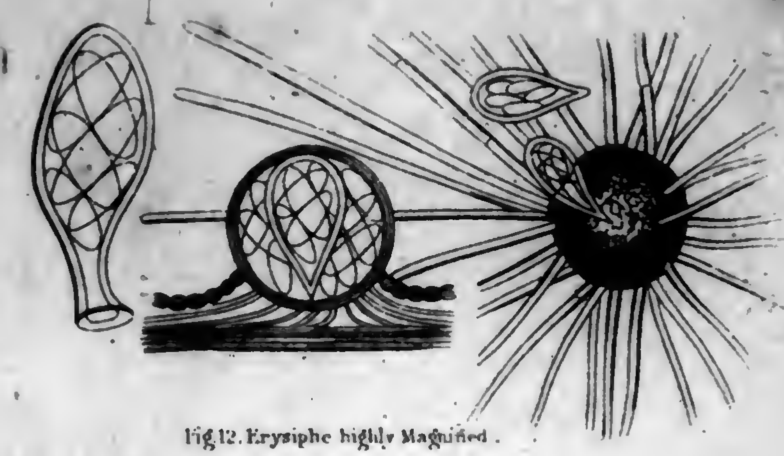

Fig. 12. Erysiphe highly Magnified.

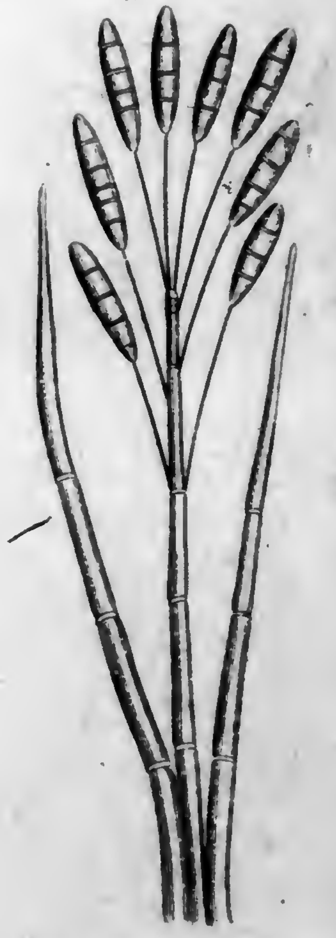

Fig. 15. Fusarium from the tuber of Potato.

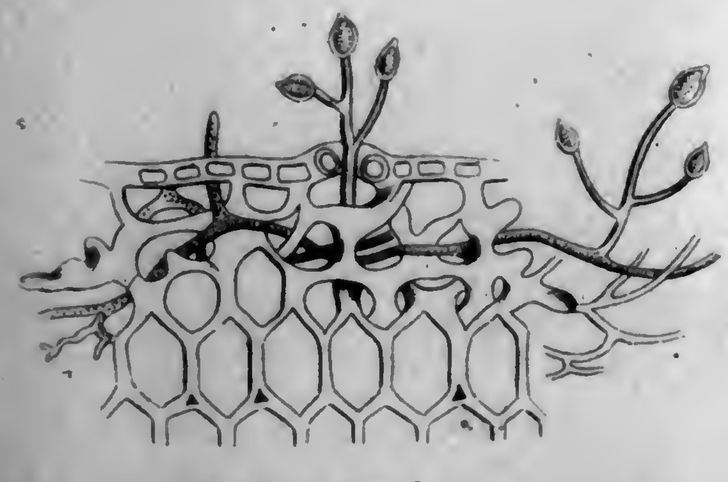

Fig. 14. Botrytis infestans.

Fig. 13. Botrytis of the vetch.

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